
JOURNAL OF THE ARNOLD ARBORETUM

VOL. XX

APRIL, 1939

NUMBER 2

ON THE BRASS COLLECTIONS OF PANDANACEAE FROM NEW GUINEA*

E. D. MERRILL AND L. M. PERRY

With two plates

THIS PAPER consists essentially of a consideration of the Pandanaceae collected by Mr. L. J. Brass on the first and second Archbold Expeditions to New Guinea. As the Papuan region is botanically not well known, in the process of determining these collections, it appeared desirable to us to include a consideration of our other unnamed Pandanaceae from New Guinea. Further, since it was necessary to survey the literature of the group, it seemed expedient at the same time to name the several collections of Mr. Brass and Mr. S. F. Kajewski from the Solomon Islands. The material examined contains forty presumably new species and new localities for thirty-eight previously described ones.

The literature is somewhat scattered and that on the Solomon Islands is very scanty. Only seven species of *Pandanus* and two of *Freycinetia* have hitherto been reported from these islands. Here, descriptions of fourteen more new species are added, five of *Pandanus* and nine of *Freycinetia*.

In 1900 Warburg, *Pflanzenr.* **3(IV.9)**: 1-87, recorded eleven species of *Pandanus* and eight of *Freycinetia* from New Guinea. Twenty-eight years later Martelli, *Pandanaceae Novae Guineae, Considerationes*, *Nuov. Giorn. Bot. Ital.* II, **34**: 1166-1170, called attention to the rapid increase in the number of known species from this region pointing out that there were then recorded from New Guinea alone thirty-four species of *Pandanus* and fifty-four of *Freycinetia*. Although Papuan representatives of all these species may have been known to Martelli, of the

*Results of the Richard Archbold Expeditions.

latter genus we have found actually published records for only thirty-four species, and are therefore inclined to believe that Martelli intended to indicate the latter figure, fifty-four probably being a typographical error. In the material we have examined, we have segregated twenty-five apparently new species, ten belonging to *Pandanus*, the rest to *Freycinetia*. Martelli's illustrations (Webbia 4) have been most helpful in the determination of the *Pandanus* species, the new ones falling readily into the sections maintained both by Warburg and by him. A key is greatly to be desired for such an unwieldy group, but this would be practically worthless without access to the types of species already established. The species of *Freycinetia* are very difficult to determine. The variation in the size of the leaves, the caducous or early deciduous auricles, the varying number of stigmas, the frequent immaturity of the syncarps in the material available, and the often more or less distorted dried berries are all inconvenient factors to be considered. The seeds show much variation in the size of the raphe and in the development of the strophiole, but these are usable characters only when mature or nearly mature fruits are available.

The term *auricle* is used somewhat loosely throughout this article to indicate the membranaceous (or submembranaceous) margin of the amplexicaul or sheathing base of the leaf. This margin may be auriculate at the distal end, or diverse in outline (rounded, truncate, or acuminate) and adnate.

The arrangement of the sections follows that of Warburg. All types, unless otherwise stated, are in the herbarium of the Arnold Arboretum.

Freycinetia Gaudichaud

Section OLIGOSTIGMA

Freycinetia inermis Ridley, Trans. Linn. Soc. II. Bot. 9: 236. 1916.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6925, 6928, 7156, 7177, June, July, 1936, common in all types of forest; Fly River, 528 Mile Camp, *Brass* 6719, May, 1936, common in undergrowth layers of ridge-forests.

Closely allied and perhaps belonging here are the two following collections: Northeast New Guinea, Wabbe, *Schlechter* 16471; Solomon Islands, San Cristoval, Hinuahaoro, *Brass* 2927, September 22, 1932, on forest trees, at 900 m. alt., common (bracts white; fruit red). These differ from the original description chiefly in having the leaves denticulate at the apex.

Freycinetia stenophylla Warburg in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee Nachtr. 53. 1905; Martelli, Webbia 3: 315. 1910, Jour. Arnold Arb. 10: 137. 1929; White, op. cit. 201.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6720, May, 1936, in undergrowth and on substage trees in ridge-forests, at 80 m. alt., common (small climber; fruit-heads \pm 1 cm. long); Palmer River, 2 miles below Black River Junction, *Brass* 6929, 7124, June, July, 1936, in undergrowth and lower substage levels of ridge-forests, at 100 m. alt., common (fruit-heads \pm 1.7 cm. long, 1.4 cm. in diameter.)

Although we have not seen the type of this species, the specimens cited conform well with the original description. All the fruit-heads are immature.

Freycinetia polyclada sp. nov. § *Oligostigma*. Pl. I, f. 3.

Rami novelli copiose foliosi, ad nodos radicanes; foliis 7-8 cm. longis, 3-4 mm. latis, linearibus, acutis, apice basique serrulatis, caeterum laevibus; auriculis \pm 2.5 cm. longis, 4 mm. latis, membranaceis, linearilanceolatis, obtusis, apice serrulatis, in fibras tandem solutis. Ramulis fructigeris brevibus, 10-12 cm. longis, \pm 4 mm. diametro; foliis angustioribus, 7(-15) cm. longis, \pm 2.5 mm. latis; auriculis vix 2 cm. longis; infructescentiis terminalibus, monocephalis; spathis foliis brevioribus latoribusque, \pm 3 cm. longis, 6 mm. latis, lanceolatis, \pm caducis; syncarpio late ellipsoideo vel subgloboso, 2.3 cm. longo, 1.7-2 cm. crasso, pedunculato; pedunculo 5 mm. longo, laevi; drupis 6 mm. longis, parte apicali 1.5 mm. longa, libera, \pm truncato-pyramidata, angulosa, annulo angusto cincta; stigmatibus vulgo 2(-3), oppositis; seminibus 1 mm. longis, subincurvis, raphe strophioleque albis, crassiusculis.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass* 4961 (TYPE), September 3, 1933, in sheltered valley-forest, at 2400 m. alt., very common (small root-climber; stems closely attached to the support-tree and ascending 10 m. or more; lateral branches appressed to the tree-trunk, very numerous; syncarps solitary; drupes orange-red); Central Division, Mafulu, *Brass* 5300, October 18, 1933, in oak forest, at 1250 m. alt., abundant (syncarps orange-yellow).

The leaves in *Brass* 5300 are about twice as long as those of the type-number, but both certainly appear to belong to the same species. *Freycinetia polyclada* is most closely related to *F. stenophylla* Warburg. It differs in having branches with both leaves and short roots usually at all the nodes, numerous short branchlets, and leaves usually with conspicuous auricles and more minute denticulations at the base and the apex.

Freycinetia Beccarii Solms-Laubach, Ann. Jard. Bot. Buitenz. **3**: 100. 1883; F. Mueller, Notes Papuan Pl. **2**: 68. 1890; Warburg, Pflanzenr. **3(IV.9)**: 30. 1900; Martelli, Webbia **3**: 309. 1910; Rendle in Gibbs, Contr. Phytog. Fl. Arfak Mts. 198. 1917; Martelli, Jour. Arnold Arb. **10**: 137. 1929; White, op. cit. 201.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 828, November 8, 1935, at about 900 m. alt.

The immature material does not seem to differ specifically from *Brass* 929 named by Martelli.

Freycinetia ellipsoidalis sp. nov. § *Oligostigma*.

Ramuli 3–4 cm. crassi; internodiis \pm 1 cm. longis, scabridiusculis; foliis late patentibus, subcoriaceis, lanceolatis, 4.5–5.5 cm. longis, \pm 1.5 cm. latis, apice acutis vel breviter acuminatis, saepe plicatis, basi paullo angustatis, subamplexicaulibus, margine et costa media inermibus, apice tantum minutissime denticulatis, subtus remotiuscule et longitudinaliter venoso-striatis; auriculis submembranaceis, in fibras cito solutis, deciduis, 0.5–1 cm. longis. Inflorescentiis terminalibus; syncarpiis 3, immaturis, oblongis, 2 cm. longis, \pm 1 cm. crassis, pedunculatis; pedunculis 1.5 cm. longis, laevibus; baccis (immaturis) 4 mm. longis, prismaticis, apice libero (1.5–2 mm. longo) convexis vel depresso-pyramidatis; vertice plano; stigmatibus vulgo 1–2.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6924, June, 1936, in forest substage, at 100 m. alt., common climber (fruit-heads immature, \pm 10 mm. long, 6 mm. diameter), *Brass* 7142 (TYPE), June, 1936, at 100 m. alt., climbing to 2–3 m. in forest undergrowth.

The species has the same general habit as *Freycinetia Beccarii* Solms-Laub., but the leaves are not so distinctly veined or dentate, the apices of the drupes are shorter and distinctly rounded or depressed, not so sharply angled or pyramidal, and the branchlets below the nodes are slightly granular.

Freycinetia nervosa sp. nov. § *Oligostigma*.

Pl. I, f. 9.

Ramuli 1 cm. crassi; foliis dissitis, patulis, membranaceis, lanceolatis vel late oblongis, 9–11(–14) cm. longis, 3–3.5(–5) cm. latis, apice plicatis, attenuatis, abruptiuscule in acumen brevem (1 cm. longum) abeuntibus, basi sensim angustatis (6–8 mm. latis); nervis parallelis utrinque prominulis, transversalibus utrinque distinctis, margine fere laevibus, apice tantum serrato-denticulatis; auriculis in fibras cito solutis, caducis. Inflorescentiis terminalibus; pedunculo communi 0.5–1 cm. longo; syncarpiis vulgo 3, oblongo-ellipsoideis, in sicco 3 cm. longis, 2 cm.

crassis, pedunculatis; pedunculis vix 1.5 cm. longis, laevibus; baccis fere usque ad apicem carnosius, angulosis, 5 mm. longis, apice acute pyramidatis; stigmatibus 1-3; seminibus vix 1 mm. longis, raphe raphidophora, strophio subnullo vel nullo.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6926* (TYPE), June, 1936, climbing to a few meters in the forests of the lower ridges, at 100 m. alt. (fruit-heads brownish pink, the largest 3.5 cm. long, 2.5 cm. in diameter), *Brass 7081*, June, 1936, climbing to 2-3 m. in ridge-forests (fruit-heads brown, to \pm 2 cm. long).

Although the texture and the venation of the leaves of *Freycinetia nervosa* are similar (at least as to description) to those of *F. streptopifolia* Warburg, we have hesitated to assign our collections to that species for two reasons: the leaves of *F. streptopifolia* are smaller than those of our material; and Martelli, *Webbia* 3: 315. 1910, reduced the species to *F. Beccarii* Solms-Laub. The syncarps and the berries as well as the leaves of the latter are much smaller than those of *F. nervosa*.

***Freycinetia elliptica* sp. nov. § *Oligostigma*.**

Ramuli \pm 5 mm. crassi; foliis dissitis, patulis, membranaceis, ellipticis, 8-10 cm. longis, 4-4.5 cm. latis, apice plicatis, abrupte acuminatis, basi breviter angustatis, \pm 7 mm. latis, nervis parallelis utrinque prominulis, transversalibus utrinque distinctis, apice tantum serrato-denticulatis; auriculis 2.5 cm. longis, cito solutis, caducis. Inflorescentiis terminalibus; syncarpiis vulgo 3, oblongo-ellipsoideis, immaturis, \pm 2 cm. longis, \pm 1 cm. crassis, pedunculatis; pedunculis circiter 1.5 cm. longis, laevibus; baccis usque ad apicem succulentis, \pm 4 mm. longis, angulosis, apice obtuse pyramidatis; stigmatibus 1-3; seminibus maturis vix 1 mm. longis, 0.5 mm. latis, raphe raphidophora, strophio nullo.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens 3810* (TYPE), August 4, 1936, at about 1500 m. alt.; Ogeramang, *Clemens 4602*, December 7, 1936, at about 2000 m. alt.

The species is very closely allied to *Freycinetia nervosa*; nevertheless, it is easily distinguished by the broader and shorter leaves, and the obtuse apex of the berries, those of *F. nervosa* having a short beak.

***Freycinetia Forbesii* Ridley, Jour. Bot. 24: 359. 1886; Martelli, *Webbia* 3: 310. 1910.**

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7209*, July, 1936, at 100 m. alt., climbing to 10 m. in the ridge-forests (fruit-heads reddish brown, globose, \pm 1.8 cm. in diameter).

Although this collection does not wholly agree with the original description, it conforms so well that we hesitate to consider it a new species without opportunity to compare it with the type. The fruit-heads are immature.

Freycinetia oblanceolata Martelli, *Webbia* 3: 176, 313. 1910; Rendle in Gibbs, *Contr. Phytog. Fl. Arfak Mts.* 197. 1917.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7132, in ridge-forests, at 100 m. alt., sporadic (a very distinctive species of loose branching habit, climbing to 3–4 m.; leaves smooth, concave towards the apex; young leaves pale underneath; unripe fruit-heads to 4.5 cm. long, 2.5 cm. in diameter; seeds pink).

The collection agrees with Martelli's description except that the stigmas are usually 2–3, the peduncles very slightly roughened along the angles, the strophiole very narrow or lacking, and usually a few raphides on either side of the raphe. These are probably differences of no great significance.

Freycinetia vulgaris sp. nov. § *Oligostigma*.

Ramuli \pm 5 cm. crassi; internodiis \pm 1 cm. longis; foliis dissitis, lineari-lanceolatis, chartaceis, 14–20 cm. longis, circiter 1.5 cm. latis, utrinque sensim attenuatis, ad basin 4–5 mm. latis, subamplexicaulibus, apice acuminatis, longitudinaliter venoso-striatis, margine fere laevibus, apice tantum minutissime denticulatis, costa media subtus versus apicem minutissime spinulosa; auriculis caducis (non vidimus). Inflorescentiis terminalibus; syncarpiis 3, oblongo-ellipticis, 1.5–2.5 cm. longis, 1–1.5 cm. latis, pedunculatis; pedunculis vix 2 cm. longis, laevibus; baccis usque ad apicem succulentis, 5 mm. longis, cylindricis (?), apice libero, brevi, convexiusculo, in summo vertice subplano; stigmatibus 2–3 (6), confluentibus, annulo levi cinctis; seminibus 1 mm. longis, raphe raphidophora, strophiole nullo.

NORTHEASTERN NEW GUINEA: Ogeramang, *Clemens* 4705 (TYPE), December 22, 1936, in hill-forest, at \pm 1750 m. alt.

At first glance this species appears to be conspecific with *Freycinetia Hollrungii* Warburg. A closer examination of *F. vulgaris*, however, shows the following differences: the fruit-heads are much more compact, the free apex of the berries is shorter, more convex and not so definitely angular, the stigmas are more obvious although the apex is not particularly pyramidal, and the seeds are smaller, the inconspicuous raphe being marked chiefly by a row of raphides on either side.

Schlechter 16412, Kelel, Northeastern New Guinea, may also belong to this species. Our specimen is very immature.

***Freycinetia Brassii* sp. nov. § *Oligostigma*.**

Ramuli \pm 5 mm. diametro; internodiis circiter 1 cm. longis; foliis (15-)20-30 cm. longis, 2 cm. latis, linearibus, acuminatis, versus basin paullo angustatis, venis inconspicuis, margine et costa media ad apicem tantum remotiuscule serrato-denticulatis; auriculis circiter 5 cm. longis, haud liberis, membranaceis, in fibras cito solutis, deciduis. Inflorescentiis terminalibus; spathis caducis; pedunculo communi brevi (0.5-1 cm. longo); syncarpiis oblongo-cylindricis, 3 (in specimine typica) 3 cm. longis, 1.3 cm. latis, pedunculatis; pedunculis 2 cm. longis, laevibus; drupis 4-4.5 mm. longis, confertis, in parte apicali (1-1.5 mm. longa) liberis, truncato-pyramidatis, vulgo pentagonis; summo vertice circiter 0.5 mm. lato, annulo angusto cincto; stigmatibus vulgo 1-3(-5); seminibus 1 mm. longis, raphe parva raphidophora, strophiole nullo vel subnullo.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6651 (TYPE), May, 1936, climbing to 6-8 m. on ridge-forest substage trees, at 80 m. alt., common (fruit-heads \pm 4 cm. long, 1.8 cm. in diameter), *Brass* 6657, May, 1936 (fruit-heads orange-red, to 4.5 cm. long, 2.5 cm. in diameter); Palmer River, 2 miles below Black River Junction, *Brass* 6927, June, 1936, in forest substage, at 100 m. alt. (large climber; leaves somewhat glaucous; fruit-heads brown, to \pm 3.5 cm. long, 2 cm. in diameter).

In the collection of Papuan species at hand, *Freycinetia Brassii* might be confused with *F. Hollrungii* Warb. Both have leaves similar in outline, deciduous auricles, internodes \pm 1 cm. long, smooth peduncles \pm 2 cm. long and berries with free truncate-pyramidal to convex apices. Differential characters of *F. Brassii* are longer leaves, stigmas definitely surrounded by a pale ring and seeds with a small inconspicuous raphe bearing raphides. The seeds of *F. Hollrungii* are 1.5 mm. long with a broad white raphe covering the larger half of the seed.

***Freycinetia Hollrungii* Warburg.** Pflanzenr. 3(IV.9):30. 1900, in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 161. 1900; Martelli, *Webbia* 3:311. 1910.

BRITISH NEW GUINEA: Western Division, Oriomo River, Dagwa, *Brass* 5994, February 25, 1934, on creek-bank in rain-forest strips, at 40 m. alt., common (scandent, straggling shrub; syncarps reddish pink); Palmer River, 2 miles below Black River Junction, *Brass* 7339, 7262, July, 1936, in the edge of the forest along stable river-banks, at 100 m. alt., plentiful (scrambling over the ground in half shade or climbing a few meters into the trees; leaves smooth and soft; fruit-heads red, very soft and fleshy, the receptacle enlarged).

From Warburg's key, l. c. (also cf. K. Schum. & Lauterb. l. c.), we assume that he separated *Freycinetia Hollrungii* from *F. scandens* Gaud. on account of the difference in the dentations of the leaf-margins, the former being serrate-dentate at the apex and occasionally just above the auricles, the latter serrate-dentate from base to apex. Martelli lists both species from New Guinea and, in a parenthetical remark, excludes *Hollrung 218* from *F. Hollrungii*. Without the original material for examination, we are at a loss clearly to define either. On account of the foliar character, we have tentatively assigned Brass's collections to *F. Hollrungii*. These specimens have practically mature syncarps; in fact, in Brass 7262 most of the berries have separated leaving the bare receptacles, the longest being 4 cm. long. The berries are about 8 mm. long, with the free angular apex (cf. *F. scandens* Gaudich. in Freyc. Voy. l'Uranie Physic. Bot. t. 42. 1826) rounded or depressed-pyramidal; the seeds are 1.5-1.8 mm. long and hardly more than 1 mm. wide, the broad cellular covering of the raphe appearing a little larger than the rest of the seed.

***Freycinetia tafaensis* sp. nov. § *Oligostigma*.**

Folia imbricata, 25-35 cm. longa, 1.5 cm. lata, acuta, subtus longitudinaliter venoso-striata, breviter vaginantia, margine supra basim per breve spatium dentata (dentibus 1.5 mm. longis, acutis), in parte apicali et costa media minute spinuloso-serrata; auriculis membranaceis, \pm 4.5 cm. longis, lanceolatis, apice truncatis spinulosisque. Inflorescentiis terminalibus; syncarpiis 4, 4.5 cm. longis, 1.5 cm. latis, pedunculatis; pedunculis \pm 1.5 cm. longis, spinuloso-scabris; baccis immaturis, \pm 6 cm. longis, prismaticis; apice (1.5 mm. longo) coriaceo; stigmatibus vulgo 2-3.

BRITISH NEW GUINEA: Central Division, Mount Tafa, Brass 5001 (TYPE in Herb. New York Bot. Gard.), September 9, 1933, in ridge crest forests, at 2400 m. alt., not uncommon (syncarps 4, pale red, about 4.5 cm. long, 2.5 cm. in diameter. Fruiting season almost over).

The collection suggests a small specimen of *Freycinetia arborea* Gaudich. probably on account of the similarity in the outline of the syncarps and the somewhat angular and truncate hardened apex of the berries; nevertheless, our species may be distinguished at a glance by the smaller size of the syncarps and the fewer stigmas, as well as by other technical characters.

***Freycinetia Klossii* Ridley, Trans. Linn. Soc. II. Bot. 9: 236. 1916.**

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, Brass 6703, 7014, May, 1936, common climber in substage layer of ridge-forests, at 80 m.

alt.; Palmer River, 2 miles below Black River Junction, *Brass* 6923, 7028, 7082 (♂), 7143, June, 1936, in forest substage, at 100 m. alt., common (leaves smooth and shining; fruit-heads red, the largest 4.5 cm. long, 2.5 cm. in diameter).

The leaves (about 35 cm. long, 7 mm. wide) of *Brass* 6703 and 7014 differ in being about half as wide as in the other collections, but the fruits seem to agree fairly well. Staminate inflorescence: spathes pale yellow, scarcely 5 cm. long, staminiferous part immature; filaments 1 mm. long, anthers rounded?

A species reasonably well marked by the following characters: the auricles when deciduous breaking transversely into fragments; peduncles scabrous only on the angles; the upper fourth part of the drupes not succulent; the strophiole of the seeds lacking or very inconspicuous.

Freycinetia sogerensis Rendle, Jour. Bot. 61: Suppl. 58. 1923.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5178, October 3, 1933, in oak forests, at 1250 m. alt., very plentiful (shortly scandent, with spreading upturned branches, or rambling amongst undergrowth; flower-spikes white; bracts white at the base; fruit not ripe); Ononge Road, Dieni, *Brass* 3908, April 29, 1933, at 500 m. alt., in forest (much branched root-climber; fruit-heads 4, radial when mature, reddish orange, up to 6 cm. long, 3.2 cm. in diameter).

This species is to be distinguished from *Freycinetia Klossii* Ridley by the following characters: fibres of the shredded auricles more or less persistent; peduncles scabrous; berries with only a narrow hardened ring at the apex; and seeds with both raphe and strophiole obvious.

Without authentic material for comparison, it is with no little hesitation that we have even tentatively assigned these collections to *F. Klossii* Ridl. and *F. sogerensis* Rendle. The description of *F. Klossii* Ridl. is so vague that it might easily be the same species as *F. sogerensis* Rendle. In addition two other descriptions which seem to be very close to these are *F. gladiifolia* Martelli and *F. fibrosa* Martelli. The isotype of the latter in the Arnold Arboretum herbarium differs from the other collections chiefly in the narrower leaves and perhaps in the more profuse fibres of the auricle-remnants. These are certainly close, if not identical, species.

Freycinetia Archboldiana sp. nov. § *Oligostigma*. Pl. I, f. 10.

Ramuli 1.5 cm. crassi; internodiis 1–1.5 cm. longis; foliis subcoriaceis, confertis, imbricatis, 70 cm. longis et ultra, versus basim circiter 2.5 cm. latis, sursum sensim attenuato-acuminatis, basi subamplexicaulibus, crebre longitudinaliter venoso-striatis, versus basim obscure tessellatis,

marginē versus basim per spatium breve serrato-dentatis, dentibus 1 mm. longis acutis, sursum obscure denticulatis; costa media in parte superiore remote adpresso-denticulata; auriculis \pm 4 cm. longis, 5–7 mm. latis, apice obtusis vel rotundatis, adnatis. Inflorescentiis terminalibus, pedunculo communi 3 cm. longo; syncarpiis (immaturis) 4–7, cylindricis, 7–10 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis 6–8 cm. longis, bi- (tri-)angulosis, angulis et interdum in parte superiore scabridis; baccis (immaturis) 6 mm. longis, prismaticis, apice (1 mm. longo) non succulentis; stigmatibus 1–3 (–5), vulgo 2; seminibus 1 mm. longis, raphe raphidophora alba, strophiole nullo.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5458 (TYPE), November 8, 1933, in forest, at 1450 m. alt., common (large climber; syncarps conspicuously marked with horizontal wrinkles; lower part of bracts pale pink).

The leaves are somewhat broken and the margins are strongly revolute. The species suggests *Freycinetia radicans* Gaudich. It is readily distinguished, however, by the several more slender syncarps and the longer and stouter peduncles.

***Freycinetia latibracteata* sp. nov. § *Oligostigma*.**

Folia vix coriacea, \pm 85 cm. longa, 3 cm. lata, sursum acuminata, basi paullo dilatata, crebre longitudinaliter venoso-striata, obscure tessellata; laminae marginē versus basim per spatium longiusculum (\pm 15 cm. longum) breviter spinuloso-dentatis, versus apicem denticulatis, caeterum laevibus; costa media in parte superiore remotiuscule minutissime spinulosa; auriculis 7 cm. longis. Spathis exterioribus foliis simillimis sed brevioribus (?), versus basim aliquantum dilatatis et valide venoso-striatis fere sulcatis; interioribus foliis dissimilibus, elongato-ovatis, navicularibus, 17–23 cm. longis, 8–11 cm. latis, venis robustis longitudinaliter percursis, marginē et costa media serrato-dentatis; syncarpiis cylindricis, \pm 11 cm. longis, \pm 1.3 cm. crassis, pedunculatis; pedunculis 6–8 cm. longis, \pm scabridiusculis praecipue in angulis, interdum ad apicem laevibus; baccis immaturis, \pm 2.5 mm. longis, prismaticis, usque ad apicem succulentis; apice plano, annulo lato stramineo cincto; stigmatibus 1–3, vulgo 2.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 6457 (TYPE), June 19, 1937, at \pm 1500 m. alt.; Ogerammang, *Clemens* 4703, December 12, 1936, at \pm 1900 m. alt.

Unfortunately the specimens are somewhat fragmentary and without descriptive field-notes. The type consists of two leaves and two separated syncarps; the second collection shows only three inner spathes and the

basal part of the outer ones and one syncarp. The species is very closely allied to *Freycinetia Archboldiana*; but, in the latter the leaves are a little narrower and shorter, the margins distinctly revolute, and the hardened apical portion of the berries is about twice as deep as in *F. latibracteata*. The spathes of *F. Archboldiana* have already fallen.

***Freycinetia undulata* sp. nov. § *Oligostigma*. Pl. I, f. 11.**

Caulis foliaceus, 1 cm. crassus; internodiis 1.5 cm. longis; foliis confertis, imbricatis, subcoriaceis, 25–40 cm. longis, circiter 4 cm. latis, apice abrupte acuminatis, recurvatis, supra valide, subtus longitudinaliter venoso-striatis, subtus obscure tessellatis, basi amplexicaulibus, vulgo in toto margine spinuloso-dentatis, dentibus patentibus, 1–2 mm. longis; auriculis membranaceis usque ad 8 cm. longis, 1.3 cm. latis, apice obtusis vel rotundatis, adnatis, laevibus. Inflorescentiis ♀ terminalibus; spathis caducis; syncarpiis 3 vel 4, oblongo-cylindricis, immaturis, 5.5–7.5 cm. longis, 1.5–3 cm. crassis, pedunculatis; pedunculis 2–3 cm. longis, laevibus; baccis immaturis, 9–10 mm. longis, obclavatis (probabiliter in maturitate lageniformibus), parte ovuligera superiore sterili paullo brevior; stigmatibus 2–3(–4); staminodiis brevibus, antherarum rudimentis subhastatis. Inflorescentiis ♂ terminalibus; spathis decrescentibus brevibus indutis, exterioribus majoribus 12 cm. longis, versus basim 6 cm. latis, margine in dimidia parte superiore spinuloso-dentata; interioribus brevioribus subcarnosis; spadicebus 3, parte staminifera cylindrica, 5 cm. longa; filamentis \pm 3 mm. longis; antheris pusillis, late oblongis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6930* (TYPE), June, 1936, restricted to river-bank forests, at 100 m. alt., common (very striking species with leafy stems closely appressed to the tree trunks; leaves of soft texture, wrinkled or undulate, purple beneath until old; flower-bracts bright yellow; flower-spikes pink).

This species is well marked by oblong leaves with short falcate apices and undulate spinulose-dentate margins, rather large brownish and membranous auricles (adnate to the apex), and very slender berries.

***Freycinetia tessellata* sp. nov. § *Oligostigma*.**

Folia subcoriacea, 80–120 cm. longa, 6–7 cm. lata, crebre et longitudinaliter venoso-striata, utrinque venis circiter 45, perspicue tessellata, apice fere abrupte acuminato-subulata, acumine \pm 3 cm. longo, margine supra basim per breve spatium serrato-dentatis, versus apicem serrato-denticulatis; costa media subtus vulgo in parte superiore remotiuscule serrato-denticulata; auriculis membranaceis, \pm 13 cm. longis, acumi-

natis, haud liberis. Inflorescentiis ternis; pedunculo communi 12 cm. longo, laevi; syncarpiis clavato-cylindricis, \pm 10 cm. longis, 3 cm. crassis, pedunculatis; pedunculis \pm 3 cm. longis, praecipue in parte apicali scabris; baccis numerosissimis, immaturis, 7–8 mm. longis, 0.5 mm. crassis, prismaticis, apice convexis; stigmatibus 2–4, annulo angusto cinctis.

SOLOMON ISLANDS: Ysabel, Maruto, *Brass* 3384 (TYPE), December 25, 1932, rain-forest, at 300 m. alt. (very large robust climber; leaves very dark green, midrib and margins near apex whitish; winged base pale with dark green nerves; fruit-heads slightly flattened; the largest *Freycinetia* on the island); Ysabel, Meringe, *Brass* 3176, November 22, 1932, common; San Cristoval, Star Harbor, *Brass* 3122, October 28, 1932; rocky hillside near the sea (very large robust plant straggling over rocks in rain-forest; fruit-heads 3, 10 cm. long, 3.5 cm. in diameter; drupes red, very slender).

This species is very closely related to *Freycinetia ponapensis* Martelli (*F. carolinensis* Kanehira, cf. Bot. Mag. Tokyo 51:906. 1937); it differs in the broader and somewhat more abruptly acuminate leaf-tips and in the scabrous peduncles of the syncarps.

Section PLEIOSTIGMA

***Freycinetia oreophila* sp. nov.** § *Pleio stigma*.

Pl. I, f. 4.

Ramuli \pm 7 mm. crassi; internodiis 1–1.5 cm. longis; foliis membranaceo-coriaceis, 15–25 cm. longis \pm 1.5 cm. latis, sursum sensim acuminatis, subtus longitudinaliter venoso-striatis, semiamplexicaulibus; laminae margine versus basim et apicem \pm serrato-denticulatis, caeterum laevibus; costa media fere a medio usque ad apicem minutissime spinulosa; auriculis 2–2.5 cm. longis, membranaceis, apice acuminatis, adnatis. Inflorescentiis terminalibus; spathis caducis (non vidimus); syncarpiis 6, globosis, immaturis 1.5 cm., maturis 3.5 cm. crassis, pedunculatis; pedunculis circiter 2 cm. longis, laevibus; baccis sublageniformibus, liberis, 12 mm. longis, \pm 4 mm. crassis, apice 5 mm. longo, anguloso, pyramidato, truncato, annulo angusto cincto; stigmatibus 3–6(–10) in circulo dispositis vel biseriatis; seminibus 2.5 mm. longis, 0.6 mm. crassis, raphe 0.4 mm. lata, strophiole nullo.

NORTHEASTERN NEW GUINEA: Morobe District, Bulung River, *Clemens* 5344 (TYPE), February 9, 1937, at \pm 900 m. alt.; Yunzaing, *Clemens* 3543, July 4, 1936, at \pm 1650 m. alt.

This species is very much like *Freycinetia lagenicarpa* Warburg as to the description of the fruit-heads. However, in our material the apex of

the berries is longer, the leaves are about twice as broad and equitant only at the apex of the branchlets, and the branchlets are not particularly acute-angled. Unfortunately, we have no authentic material of *F. lagenicarpa* for comparison.

***Freycinetia linearifolia* sp. nov. § *Pleio stigma*.**

Freycinetia sp. Martelli, Jour. Arnold Arb. **10**: 137. 1929; White, op. cit. 202.

Ramuli 3–4 mm. crassi, trigoni; internodiis 5–6 mm. longis, laevibus; foliis linearibus, subcoriaceis, 12–25 cm. longis, 4–6 mm. latis, acuminato-subulatis, basi vix angustatis, semiamplexicaulibus, margine (in foliis novellis minute spinuloso-serratis) ad basim apicemque tantum et costa media subtus in parte superiore serrato-dentatis; auriculis scarioso-membranaceis, \pm 1 cm. longis, versus apicem fimbriatis, cito solutis, caducis. Inflorescentiis interdum in ramulis brevibus terminalibus; spathis usque ad 4 cm. longis, 2 cm. latis, caducis; syncarpiis immaturis, 4–8 mm. longis, 3–6 mm. crassis, pedunculatis; pedunculis vix 1 cm. longis, laevibus; baccis 2 mm. longis, prismaticis; stigmatibus 4–6, confluentibus.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass 6698* (TYPE), May, 1936, on lower trunk of substage trees, at 80 m. alt., plentiful (flower-bracts pale green; fruit-heads unripe, almost globose, \pm 1 cm. in diameter); Gulf Division, Murua River, *Brass 1332*.

This species differs from the description of *Freycinetia lagenicarpa* Warburg in the fimbriate margins of the auricles, and in having confluent stigmas (at least in our immature specimens). It is also very close to *F. Gibbsiae* Rendle, but the fertile branches are not always dwarf-like, and the caducous spathes are much smaller than in the latter species.

***Freycinetia stenodonta* sp. nov. § *Pleio stigma*.**

Rami circiter 5 cm. diametro, scabridiusculi; internodiis \pm 1 cm. longis; foliis dissitis, patulis, coriaceis, elongato-ovatis, 4–6 cm. longis, 2–3 cm. latis, obtuse apiculatis, longitudinaliter minute venoso-striatis, basi amplexicaulibus, margine et costa media subtus spinuloso-dentatis; auriculis membranaceis, spinuloso-dentatis, cito caducis, \pm 5 mm. (?) longis, 2 mm. latis. Inflorescentiis apice ramulorum brevium dispositis; spathis caducis; pedunculo communi brevissimo; syncarpiis 4, immaturis, vix 1 cm. longis, 4–5 mm. crassis, maturitate 2.5 cm. longis, 1.5 cm. (?) crassis, pedunculatis; pedunculis 1.5–2 cm. longis, laevibus; baccis usque ad apicem succulentis, oblongis, \pm 4 mm. longis; apice rotundato-pyramidato; stigmatibus 2–5; seminibus leviter falcatis, vix 1 mm. longis, raphe raphidophora et strophiole albis cinctis.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3838 (TYPE in Herb. New York Bot. Gard.) on rain-forest trees, at 500 m. alt., common (small root-climber; leading shoot flatly attached to the host-trees by adventitious roots; branches drooping).

This species suggests *Freycinetia sphaerocephala* Gaudich. in general habit. It is readily separable, nevertheless, by several characters. The leaves are much broader with more definitely spinulose margin; the auricles are narrower and disappear very early so that only the scar or the broken margin remains. The syncarps are cylindric and although the specimen of mature fruit is old and difficult to interpret, the berries are certainly much more crowded on the syncarp than in *F. sphaerocephala*. The seeds too are quite different, those of the latter species being longer, almost straight and easily distinguished by the broad white raphe (the strophiole practically lacking). In *F. stenodonta* the strophiole is scarcely half as thick as the rest of the seed and the raphe is relatively inconspicuous except for the two rows of raphides borne by it.

Freycinetia salamauensis sp. nov. § *Pleio stigma*. Pl. I, f. 7.

Ramuli \pm 5 mm. crassi; internodiis 1 cm. longis, laevibus; foliis oblongo-lanceolatis, 4–9 cm. longis, 2–3 cm. latis, apice acuminatis, utrinque longitudinaliter venoso-striatis, basi abrupte angustatis, amplexicaulibus, margine versus apicem basinque et costa media spinuloso-dentatis; auriculis scarioso-membranaceis, margine spinulosis, caducis. Inflorescentiis terminalibus; pedunculo communi \pm 5 mm. longo; syncarpis 4–5, immaturis, 1–1.6 cm. longis, 4–7 mm. crassis, maturis 6 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis 2–2.5 cm. longis, angulosis, angulis apiceque \pm hispidulis vel strigulosis; baccis immaturis prismaticis; apice plano; stigmatibus 2–6, saepissime 3, annulo angusto cinctis; maturis \pm 3 mm. longis, usque ad apicem succulentis; seminibus vix 1 mm. longis, raphe et strophiole latis.

NORTHEAST NEW GUINEA: Mayen, *Schlechter* 17910, July 6, 1908, at 50 m. alt.; Morobe District, Sattelberg, Salamaua, *Clemens* 28 (TYPE), August 27, 1935, forest margin, at 300 m. alt.

The description of *Freycinetia Biroi* Warburg is very like that of *F. salamauensis*. In the former, however, the common peduncle is 2.5 cm. long, those of the syncarps are 1 cm. long and smooth; whereas, in the latter the common peduncle is 5–8 mm. long and those of the syncarps are 2.5 cm. long, also the angles and the apex are hispidulous.

Freycinetia anomala sp. nov. § *Pleio stigma*. Pl. I, f. 8.

Ramuli 6 cm. crassi; internodiis \pm 2 cm. longis; foliis lineari-lanceolatis, circiter 18 cm. longis, 1.2–1.5 cm. latis, apice sensim acuminatis,

supra obscure, subtus longitudinaliter crebre minuteque venoso-striatis; versus basin angustatis, fere plicatis, subito latioribus, amplexicaulibus; margine et costa media saepissime inermibus; auriculis cito deciduis, membranaceis, ambitu rotundatis. Inflorescentiis terminalibus, pedunculo communi 1 cm. longo; syncarpiis (immaturis) 4, cylindricis, 4 cm. longis, 1 cm. crassis, pedunculatis; pedunculis circiter 4 cm. longis, laevibus; baccis (immaturis) prismatico-cylindricis, (tetra-)pentagonis, \pm 5 mm. longis, 3-4 mm. crassis, liberis, succulentis, parte apicali brevi (\pm 2 mm.), \pm rotundatis, infra stigmata paullo constrictis; stigmatibus 3-6, vulgo 4-5, pulvinatis; seminibus immaturis; staminodiis vix 0.5 mm. longis.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2886, (TYPE), September 22, 1932, mountain-forests, at 900 m. alt., common (large climber; leaves thick and rather fleshy, quite unarmed).

A well marked species; syncarps cylindric, the numerous berries crowned by a group of convex, \pm cushion-like stigmas unlike any others examined; seeds immature, crescent-shaped. Leaves unarmed, the base somewhat expanded and amplexicaul. Only remnants of the auricles remain attached to the specimen.

***Freycinetia pectinata* sp. nov. § *Pleciostigma*.**

Ramuli 6 cm. crassi; foliis linearibus, 15-20 cm. longis, 9 mm. latis, sursum attenuato-acuminatis, basi breviter vaginantibus, subtus longitudinaliter crebre minuteque venoso-striatis, margine supra basim per spatium breve breviter pectinato-dentatis, in parte media inermibus. in parte superiore revolutis et minutissime denticulatis; costa media fere e medio usque ad apicem minute adpresso-dentata; auriculis membranaceis, \pm 2 cm. longis, deciduis vel subpersistentibus, apice rotundatis, pectinatis. Inflorescentiis terminalibus; syncarpiis 4, cylindræcis, circiter 4 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis ad apicem squamuloso-scabridis, angulis squamuloso-denticulatis; drupis (immaturis) sublageniformibus, liberis, 5 mm. longis; vertice plano, annulo angusto cincto; stigmatibus 4-6(-12), vulgo in circulo dispositis.

SOLOMON ISLANDS: Ysabel Island, Kakatio, *Brass* 3247 (TYPE), December 1, 1932, climbing on rain-forest trees, at 900 m. alt., common.

The striking character of this species is the pectinate margin of the auricle-apices and (for a short space) the adjoining margins of the leaves. The syncarps show some resemblance to those of *Freycinetia Hombronii* Martelli of Samoa, but the latter are shorter and broader than in our species.

Freycinetia divaricata sp. nov. § *Pleio stigma*.

Pl. I, f. 2.

Ramuli 6 cm. crassi, internodiis \pm 8 mm. longis, scabridiusculis; foliis lineari-lanceolatis, 16–18 cm. longis, 1.5–2 cm. latis, apice sensim acuminate, semiamplexicaulibus, dissitis, patenti-ascendentibus, obscure venosis, margine versus basim et apicem minute dentato-serratis; costa media in parte superiore remote spinulosa; auriculis in fibras cito solutis, 1.5–2 cm. longis, deciduis. Inflorescentiis terminalibus; pedunculo communi circiter 5 mm. longo; syncarpiis ovato-ellipsoideis, \pm 3 cm. longis, 2 cm. crassis, pedunculatis; pedunculis \pm 2 cm. longis, laevibus; baccis circiter 6 mm. longis, lageniformibus, in parte superiore liberis; apice subplano, annulo cincto; stigmatibus 3–4; seminibus 1.2 mm. longis, paullo incurvis, raphe et strophiole albis, crassiusculis.

SOLOMON ISLANDS: Florida Islands (N'Gela), Olevuga Island, *Brass* 3480 (TYPE), January 16, 1933, common in swampy lowland forests (climber of stiff divaricate branching habit; stems brown; leaves somewhat glaucous beneath; fruit-heads about 3.5 cm. long, 2 cm. in diameter).

The general habit of this specimen suggests *Freycinetia scandens* Gaudich., at least as to *plate* 42 (Frey. Voy. l'Uranie Physic. Bot. 1826), but the leaves are unarmed except at the apex and the base, and the berries appear to be more elongate at the apex.

Freycinetia marantifolia Hemsley, Kew Bull. 164. 1896; Warburg, Pflanzenr. 3(IV.9): 36. 1900; Martelli, Webbia 3: 312. 1910.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2932, September 22, 1932, climbing on forest trees, at 900 m. alt.; Ysabel Island, Suwa, *Brass* 3230, November 26, 1932, climbing in rain-forest, at 300 m. alt., common (lower surface of leaf-base pink; fruit-heads up to 5 cm. long, 3.5 cm. in diameter; drupes red tipped with green).

Freycinetia decipiens sp. nov. § *Pleio stigma*.

Ramuli circiter 5 mm. crassi; internodiis \pm 1.5 cm. longis, granulari-scabridiusculis; foliis subcoriaceis, oblongis, 13–18 cm. longis, 2.5–3.5 cm. latis, utrinque angustatis, apice breviter acuminatis, basi 0.5–1 cm. latis, semiamplexicaulibus, \pm 36-nerviis, margine fere laevibus, apice tantum denticulatis; auriculis caducis (non vidimus). Inflorescentiis terminalibus; spathis caducis; syncarpiis 2(–4), ellipsoideis, \pm 2 cm. longis, \pm 1.5 cm. crassis, pedunculatis; pedunculis circiter 2.5 cm. longis, angulis scabridiusculis; baccis prismaticis (?), ad apicem succulentis; apice libero, breviter pyramidato, anguloso; vertice convexo, annulo prominulo cincto; stigmatibus 3–6; seminibus 1.4 mm. longis, paullo

curvatis, raphe raphidophora, strophiole manifesto (0.2 mm. lato).

SOLOMON ISLANDS: San Cristoval Island, Star Harbor, *Brass 3138* (TYPE), October, 1932, climbing on trunk of rain-forest tree, at 50 m. alt., *Brass 3113*, October 28, 1932, in hill rain-forests, at 50 m. alt., common (bracts very thick and fleshy, cream-colored with paler tips).

This species looks very much like *Freycinetia marantifolia* Hemsl. The latter, however, has smooth internodes, and the stigmatic part of the apex of the berries is flat rather than convex as in *F. decipiens*.

Freycinetia funicularis (Savigny) Merr. Interpret. Rumph. Herb. Amboin. 83. 1917.

Pandanus funicularis Savigny in Lam. Encycl. 4: 735. 1798.

Freycinetia strobilacea Blume, Rumphia 1: 156, t. 39. 1835; Schnizlein, Icon. 1: t. 74, f. 3-5. 1846; Solms-Laubach, Ann. Jard. Bot. Buitenz. 3: 99. 1883; Warburg in Engler Pflanzenr. 3(IV.9): 34. 1900; Martelli, Webbia 3: 315. 1910.

SOLOMON ISLANDS: San Cristoval, Hinuahaoro, *Brass 3016*, *3017*, September 16 and 22, 1932, in mountain rain-forests at 900 m. alt.

Type from Amboina; reported also from New Guinea.

Our collections, at least as to foliar characters are a good match for the Amboina material. We were unable to locate a description of the fruit of this species, although Warburg notes that the fruit is eaten by natives. In the specimen, *Brass 3017*, the infructescence consists of one syncarp and the base of another on peduncles 3-3.5 cm. long, supported by a common peduncle about 2.5 cm. long.

Syncarp 12 cm. long, 2 cm. thick, approximately cylindric; drupes \pm obpyriform and free, the apex truncate-pyramidal with the uppermost 2 mm. subligneous or coriaceous; stigmas 4-6, arranged \pm in a circular manner, separated and surrounded by a smooth, narrow, light-colored and often shiny margin; seeds linear, \pm 2.5 mm. long, 0.4 mm. wide, raphe 0.2 mm. thick, a little longer than the rest of the seed and about the same color.

If our material is correctly named, *Freycinetia funicularis* belongs to the section *Pleio stigma*. In several characters Ridley's *F. rhodospatha* agrees with this species, but we have no authentic material for comparison.

Freycinetia oligodonta sp. nov. § *Pleio stigma*.

Ramuli circiter 7 mm. crassi; internodiis 4 mm. longis; foliis ad apicem ramorum confertis, imbricatis, 25-30 cm. (et ultra?) longis, 1-1.3 cm. latis, apice acuminatis, utrinque longitudinaliter crebre venoso-striatis, inconspicue tessellatis, basi vaginantibus; margine et costa media inermi-

bus, apice tantum interdum remote denticulatis; auriculis scarioso-membranaceis, 2-3 cm. longis, apice truncatis vel obtusis, adnatis. Inflorescentiis terminalibus; syncarpiis immaturis, 3, cylindricis, vix 2.5 cm. longis, 1.2 cm. crassis, pedunculatis; pedunculis 3.5-4 cm. longis, laevibus; baccis (immaturis) prismaticis vel \pm cuneatis, liberis; stigmatibus circiter 4-8, \pm confluentibus; staminodiis brevissimis (0.4 mm. longis).

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2930 (TYPE), September 22, 1932, in mountain rain-forests, at 900 m. alt., common (large climber; leaves somewhat fleshy, very smooth, with winged transparent sheathing base very conspicuously veined).

Although suggesting *Freycinetia Hombronii* Martelli, *F. oligodonta* is clearly a distinct species easily recognized by the almost entire leaves with thinly membranaceous auricles and the smooth peduncles.

Freycinetia nesiotica sp. nov. § *Pleiostigma*.

Pl. I, f. 6.

Ramuli 7 mm. crassi; internodiis \pm 1 cm. longis, laevibus; foliis imbricatis, coriaceis, \pm 60 cm. longis, 1-1.5 cm. latis, linearibus, versus apicem longe attenuato-acuminatis, basi vaginantibus, utrinque longitudinaliter venoso-striatis, margine \pm revolutis, supra basim per breve spatium serrato-denticulatis, versus apicem serrulatis; costa media in parte superiore minute spinulosa; auriculis in fibras cito solutis, deciduis, circiter 3 cm. longis. Inflorescentiis φ terminalibus, pedunculo communi 1.5 cm. longo; syncarpiis 3, ellipsoideis, 4 cm. longis, 3 cm. crassis, pedunculatis; pedunculis 2.5 cm. longis, angulosis, angulis et apice squamuloso-scabridis; baccis \pm 1 cm. longis, angulato-obclavatis, versus apicem non succulentis; vertice plano; stigmatibus 4-6, quoque annulo angusto cincto; seminibus 2 cm. longis, vulgo rectis, raphe crassa, strophilo nullo.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2929 (TYPE), September 22, 1932, in mountain rain-forests, at 900 m. alt., common (robust climber with very dark green fruit on rigid peduncles).

Superficially this species is very similar to *Freycinetia membranacea*, but the leaves are distinctly coriaceous, the berries are fewer to a syncarp, a little shorter and slightly thicker than those of the latter species and the seeds are a little plumper, being about 0.6 mm. in diameter (those of *F. membranacea* are about 0.4 mm. thick and often bear raphides).

Freycinetia membranacea sp. nov. § *Pleiostigma*.

Pl. I, f. 5.

Ramuli 7-10 mm. crassi; internodiis 1.5-2 cm. longis; foliis imbricatis,

membranaceis, \pm 60 cm. longis, 1.5 cm. latis, longitudinaliter venoso-striatis, apice acuminatis, basi vaginantibus; margine supra basim per spatium breve denticulatis, versus apicem incerte denticulatis; costa media subtus in parte superiore minute spinulosa vel serrata; auriculis submembranaceis, fragilibus, fragmentis caducis. Inflorescentiis φ terminalibus, pedunculo communi 7 cm. longo; syncarpiis 3, ellipsoideis, 6 cm. longis, 3.5 cm. crassis, pedunculatis; pedunculis 2.5–3 cm. longis, angulosis, angulis scabridis; baccis \pm 12 mm. longis, versus basim connatis, obclavatis vel sublageniformibus, apice (4–5 mm. longo) prismaticis, vertice plano; stigmatibus 4–6, quoque annulo angusto cincto; seminibus 1.5–2 mm. longis, vulgo rectis, raphe crassa, strophio nullo.

SOLOMON ISLANDS: Bougainville, Siwai, *Waterhouse 168* (TYPE in Herb. New York Bot. Gard.), December, 1932 (trailing shrub with striking white blossom).

In habit this species strongly resembles *Freycinetia nesiotica*. It differs, however, in the membranaceous texture of the leaves and possibly of the auricles (those of the latter species splitting lengthwise into fibres, those of *F. membranacea* breaking transversely into pieces), the larger syncarps and the much longer common peduncle.

Kajewski 2184, Marmaromino, Buin, Bougainville Island, September 28, 1932, at 50 m. alt. (common plant climbing well up rain-forest trees; leaves with very small serrations; fruit-heads 4 cm. long, 2.2 cm. in diameter, red when ripe), may also belong here. The leaves and the auricles are similar to those of this species; the fruit-heads are very young but the angles of the secondary peduncles are smooth.

***Freycinetia petiolacea* sp. nov. § *Pleiostigma*.**

Ramuli 4–9 mm. crassi, obtuse angulati; internodiis 1.5–2 cm. longis; foliis lanceolatis (3.5–) 5 cm. latis, \pm 35 cm. longis, subamplexicaulibus, versus basim longe angustatis et acute plicatis, ad apicem abrupte caudato-acuminatis, longitudinaliter venoso-striatis; margine fere integro, ad apicem serrulato; costa media subtus acuta in apice serrulata; auriculis 5–7 cm. longis, membranaceis, in fibras tandem solutis. Inflorescentiis terminalibus; spathis caducis; pedunculo communi \pm 7 cm. longo; syncarpiis 2–3, ellipsoideis, usque ad 5 cm. longis, 2 cm. crassis, pedunculatis; pedunculis \pm 1.5 cm. longis, laevibus; baccis liberis, oblongis, immaturis, 6 mm. longis, apice subplano; stigmatibus 3 10, annulo duro stramineo cinctis.

SOLOMON ISLANDS: Ysabel Island, Kakatio, *Brass 3256* (TYPE), December 1, 1932, at 900 m. alt.; San Cristoval Island, Hinuahaoro, *Brass 2931*, September 22, 1932; Bougainville Island, Koniguru, Buin,

Kajewski 2147, August 24, 1930, at 900 m. alt. Climbing on forest-trees.

The leaves of *Freycinetia petiolacea*, although larger, are very much like those of the Fijian *F. caudata* Hemsl. both in the caudate apex and in the long (8–10 cm.) plicate basal portion, but the syncarps are easily separable in the two species: those of the first are ellipsoid with fairly long berries; whereas, those of the second are narrowly cylindric with much shorter and more uniform berries.

Freycinetia pseudo-insignis Warburg, Pflanzenr. 3(IV.9): 33. 1900, et in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee, Nachtr. 52. 1905; Martelli, Jour. Arnold Arb. 10: 138. 1929; White, op. cit. 201.

Freycinetia insignis Bl. aff. K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 18. 1889.

Freycinetia novo-guineensis Warburg, Pflanzenr. 3(IV.9): 34. 1900, pro parte (fide Martelli, Webbia 3: 313. 1910).

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass 4964*, September 3, 1933, in valley forest, at 2400 m. alt., very plentiful (very large root-climber ascending tall trees and sending out numerous stout upturned branches; branches 3.5–4 cm. in diameter close below the leafy top; leaves numerous at branch ends, in three series, of soft texture, somewhat glaucous beneath; margins and apex of young leaves purple. As many as seven large immature syncarps pendent on flexible peduncles; the largest syncarp measured 16 cm. \times 4.5 cm., the smallest 9 cm. \times 3.8 cm.; base of drupes orange-red, apex green); Central Division, Ononge Road, Dieni, *Brass 3850*, April 22, 1933, in rain-forests, at 500 m. alt., common (fine large root-climber; stems not much branched, 3.5 cm. diameter 1 m. below the fruiting top; leaves very dark, shining, in three series, lower surface striate, average length about 1.4 m. long, 6 cm. wide, sheathing the stem for about 8 cm.; leaves immediately below the inflorescence slightly shorter and broader and red at the base; inflorescence 3, upright, reddish pink; cylindric heads 17 cm. long, 5 cm. in diameter).

These specimens appear to be a good match for *Brass 1052* named by Martelli. Unfortunately none of the specimens show mature fruit. There can be no doubt, however, that this species belongs to the section *Plelostigma* rather than to *Oligostigma*. The drupes are \pm obclavate and angular with a flat apex bearing 4–6(–10) stigmas.

Somewhat hesitantly we add here the following collection; *Brass 7426*, Oroville Camp, Fly River (30 miles above D'Albertis Junction) (ascending to upper branches of rain-forest canopy trees; outer bracts purple, inner orange-red). This differs from the other collections in its obviously

narrower leaves. The anthers of the ♂ inflorescence are about 3 mm. long. The ♀ inflorescences are immature but they appear to be much like those of *Brass 1052*.

***Freycinetia laeta* sp. nov. § *Pleio stigma*.**

Pl. I, f. 1.

Folia numerosa, coriacea, \pm 140 cm. longa, 7.5 cm. lata, versus apicem breviter acuminata, acumine \pm 2.5 cm. longo, versus basim paullo angustata (5 cm. lata), in pagina inferiori tessellata; margine in parte media laevibus, ceterum remotiuscule serrato-dentatis; costa media subtus prominente, versus apicem tantum remotiuscule serrato-dentata; auriculis 25–30 cm. longis, vix 3 cm. latis, submembranaceis, acuminatis, in sicco atro-fuscis. Spathis exterioribus foliis simillimis sed multo brevioribus, versus basim aurantiacis, interioribus carnosulis, roseis, late ovatis, \pm 22 cm. longis, 8–9 cm. latis, apice abrupte acutis vel acuminatis vel cuspidatis. Inflorescentiis ♀ ternis; pedunculo communi \pm 1 cm. longo; syncarpiis novellis 5–7 cm. longis, 1–1.5 cm. crassis, versus maturitatem oblongis, 14 cm. longis, 4 cm. crassis, pedunculatis; pedunculo 3–3.5 cm. longo, juxta syncarpium scabridiusculo; drupis 2 cm. longis, linearibus, in parte apicali (4 mm. longa) liberis, anguste truncato-pyramidalis; stigmatibus 3–12 et ultra, vulgo biseriatis; seminibus 1.4 mm. longis, 0.4 mm. latis, rectis; raphe raphidophora, strophiole nullo. Inflorescentiis ♂ ternis; pedunculis 3.5 cm. longis, laevibus; parte staminifera 6 cm. longa, cylindracea; staminibus plurimis, filamentis 4 mm. longis, antheris parvis, oblongis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7031* (TYPE), June, 1936, at 100 m. alt., common (magnificent climber ascending halfway up trunks of large canopy trees; leaves numerous; basal parts of the outer bracts of the inflorescence orange-yellow, the fleshy inner bracts pink; ♀ flower-spikes greenish white, \pm 8 cm. long, 2.5 cm. in diameter).

In habit this species suggests *Freycinetia pseudo-insignis* Warb., but differs in the broader leaves with somewhat more abruptly acuminate apex, the larger auricles, and the usually biseriate arrangement of the several stigmas.

Warburg's *Freycinetia polystigma* with biseriate stigmas is probably a close ally of *F. laeta*, but the spathe subtending the spadix is very much narrower than those in our species.

***Freycinetia percostata* sp. nov. § *Pleio stigma*.**

Pl. I, f. 12.

Rami circiter 2 cm. crassi; foliis imbricatis, infra infructescentiam \pm 70–75 cm. longis, 2.5–3 cm. latis, apice sensim longe attenuatis, longitudinaliter crebreque venoso-striatis, basi amplexicaulibus, margine

versus basim dentibus patentibus brevibus subulatis armatis, caeterum brevissime serrato-denticulatis; costa media subtus (basi excepta) brevissime serrato-denticulata; auriculis 7 cm. longis, apice (1.5 cm.) liberis, obtusis, spinoso-denticulatis. Infructescentiis terminalibus: syncarpiis 3-4, elongato-cylindraceutis, 13.5 cm. \times 2.4 cm. (novellis) -21 cm. \times 4 cm. (in maturitate), pedunculatis; pedunculis 4-5.5 cm. longis, scabris; baccis numerosissimis, confertis, 2 cm. longis, 4-6 mm. latis, 2 mm. crassis, compressis, infra apicem coriaceum seminiferis, in parte superiore truncato-pyramidatis, longitudinaliter et irregulariter 5-6 costis carinatis notatis; vertice plano, ambitu oblongo (2 mm. longo, 1 mm. lato), annulo prominulo cincto; stigmatibus (4-)8-12(-20), biseriatis; seminibus minutis, 1.5 mm. longis, 0.5-0.6 mm. latis, raphe et strophio angusto inconspicuis.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7860 (TYPE), September, 1936, a few plants climbing high on rain-forest trees (stems not twisted, thus showing clearly the 3-ranked phyllotaxy; leaves glaucous; fruit-heads 3 or 4, up to 24 cm. long, 6 cm. in diameter; berries green with a red apex). SOLOMON ISLANDS: Bougainville Island, Koniguru, Buin, *Kajewski* 2131, at 950 m. alt.

The plant from Bougainville Island is an immature and poorly preserved specimen, but it hardly seems to differ from the New Guinean collection except that the dentations of the leaf-margins are not so closely appressed. The species shows some resemblance to *Freycinetia longispica* Martelli from New Caledonia. The latter differs, however, in the much longer common peduncle, the fewer stigmas, the more obtusely angled drupes, and also in the acuminate membranaceous auricles and the less dentate leaf-margins.

Pandanus Linnaeus

Section KEURA

Pandanus capitellatus sp. nov. § *Keura*.

Pl. II, f. 7.

Planta recta, usque ad 6 m. alta; trunco 5-6 cm. diametro. Foliis infra spadice \pm 1.3 m. longis, 1.5 cm. latis, linearibus, apice sensim acuminatis, basi dilatatis, amplexicaulibus; margine serrato-dentato, dentibus brevibus, acutis; costa media subtus obtusa, in parte inferiore inermi, apicem versus denticulata; plicis lateralibus versus apicem denticulatis. Syncarpio solitario, oblongo-ovoideo, 9-12 cm. longo, 7 cm. lato, a plurimis phalangibus compactis formato; phalangibus in tertia parte superiore liberis, 3-4 cm. longis, 1.7-2.5 cm. latis (in parte superiore), cuneatis, in parte inferiore angustatis, apice subrotundatis, superne vix

in pyramidem elevatis; loculis circiter 4-6, subaequalibus; stigmatibus paullo elevatis, 2-3 mm. latis, horizontaliter rotundato-hippocrepiformibus; endocarpio osseo, in dimidia parte superiore phalangis locato; mesocarpio supero compacte medullosa-fibroso.

SOLOMON ISLANDS: Ysabel Island, Tatamba, *Brass 3414* (TYPE), January 3, 1933, in hardwood forests, at 50 m. alt., common (erect slender tree up to 6 m. tall; trunk 5-6 cm. in diameter, supported on thick prop-roots; stem branched near the top and bearing numerous short blunt prickles; leaves numerous, stiff, glaucous-green on the lower surface; drupes glaucous).

The syncarp of this species superficially suggests *P. Kanchirae* Martelli. The formation of the phalanges with 4-6(-7) drupes is distinctly visible on account of the deep furrows that separate the drupes, and the cross section of the endocarp is irregularly stellate. Nevertheless, *P. capitellatus* differs from *P. Kanchirae* in the oblong syncarp, the more uniform and smaller phalanges, and the quite different apices of the drupes. In *P. Kanchirae* the apex is a small flat areola (probably to be regarded as part of the style) with the stigma excentric; in our species the stigmatic disk is slightly elevated and more or less reniform to rounded in outline.

Pandanus Kaernbachii Warburg, Pflanzenr. 3(IV.9): 49, f. 13D. 1900; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 159. 1900; Martelli, Webbia 4: 18, t. 6, f. 3-4. 1913.

BRITISH NEW GUINEA: Sturt Island, Lower Fly River, *Brass 8139*, October, 1936, abundant in substage of flood-plain rain-forests (stem 8-10 m. long, supported on flying buttress-roots, and with a few short terminal branches forming a small crown; leaves pliant, somewhat glaucous; fruit-heads terminal, 1-2 or 3 to each peduncle; individual fruit-heads subglobose, $\pm 17 \times 16$ cm.; drupes syncarpous, orange-red).

The phalanges of the above cited collection correspond fairly well with Martelli's figures of this species. The leaves are ± 1.9 m. long, 8-8.5 cm. broad, longitudinally striate in the upper part becoming smooth toward the base, with dentate-serrate margins, and a short bluntly acuminate apex. In Warburg's key this species is classified under solitary syncarps. The field-note given above indicates that this character is variable.

Pandanus scabibracteatus Martelli, Jour. Arnold Arb. 10: 139. 1929, White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass 5893*, February 6, 1934, river-bank forest tree, at 5 m. alt., not common (erect, 6-7 m., with branched top; prop-roots absent; trunk and

branches somewhat prickly; leaves soft-textured, glaucous, up to about 1.8 m. long, the edges turned downwards so that the leaf takes the form of the letter M in cross section; one branch bore two terminal leafy shoots, one with 3, the other with 4 syncarps in racemose arrangement, drooping and hanging amongst the leaves; average syncarp 15×11 cm.; drupes connate in clusters, glaucous purple over orange-red).

Although the type, *Brass* 987, shows only very young fruits, a careful comparison of the two as to foliar and inflorescence-characters has led to the conclusion that both represent the same species. The fruits of *Brass* 5893 are still immature; the phalanges (3.5 cm. long, 2–2.5 cm. broad, 1.5 cm. thick, the free apex 0.5 cm. high) are somewhat flattened at the apex and here divided into short convex- or depressed-pyramidal apices with slightly elevated stigmas, locules 8–9.

Among the New Guinean species this seems most like *P. Kaernbachii* but in the latter the syncarps are subglobose rather than oblong, and the phalanges have a more rounded and longer free apex than those of *P. scabribracteatatus*.

Pandanus novo-hibernicus (Martelli) Martelli, *Webbia* 4(1): 25. 1913, 4(2): t. 39, f. 1–5. 1914.

Pandanus tectorius Soland f. *novo-hibernica* Martelli, *Bot. Jahrb.* 49: 63. 1912.

SOLOMON ISLANDS: San Cristoval Island, Kira Kira, *Brass* 2837, a river-bank species, not common (tree 6–7 m. tall, stem solitary with thick, crooked, ascending branches very flat at their insertion on the stem; trunk supported on thick prickly aërial roots; stem and branches with scattered short thick prickles; younger branches smooth and shining; leaf-scars very conspicuous; leaves finely tapered, stiff, glaucous, with numerous marginal and scattered dorsal prickles, average size about 2.3 m. long, 8 cm. broad; fruit-heads pendulous, about 28 cm. long, 20 cm. in diameter; drupes connate in clusters).

Type from New Mecklenburg, Bismarck Archipelago.

The phalanges of *Brass* 2837 appear to be a perfect match for Martelli's figures. The leaves are a little broader than those of the original description (described as young) and slightly dilated at the base.

***Pandanus novo-hibernicus* var. *inermis* var. nov.**

A forma typica recedit foliis undique inermibus; syncarpio vix oblongo, subgloboso.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2664, August 16, 1932, common on banks of streams in rain-forests (tree 10 m. tall, growing in clumps and supported on prickly aërial roots up to 1 m.

long, 5 cm. diameter; stem ringed with leaf-scars, with numerous broad blunt prickles and very short appressed adventitious roots; above each leaf-scar, even on the lower trunks of old trees, is a small dead persistent vegetative bud; leaves in three well defined spirals, smooth, tough, about 2 m. long, 7 cm. wide; inflorescence erect in the early stages, drooping as the fruit grows; fruit-heads about 20 cm. in diameter; drupes connate in bundles. Leaves used in the manufacture of sleeping mats).

The phalanges of this variety can scarcely be distinguished from those of the species; the fruit-head, however, is not so long and the margins, midrib and lateral folds of the leaves are smooth.

Pandanus tectorius Soland. var. **timorensis** Martelli, Webbia 4(1): 34. 1913, *nomen nudum*, 4(2): 414, t. 19, f. 4-5. 1914, *descr.*

BRITISH NEW GUINEA: Western Division, coast between Oriomo and Fly Rivers, *Brass* 6407 ♀, 6407A ♂, March and April, 1936, the common strand species (thickly foliated tree 4-6 m.; leaves flexible and somewhat glaucous).

Type from the island of Timor; not previously reported from New Guinea.

Here again Martelli's figures are most helpful. The phalanges of this collection are 5.5 cm. long instead of 4 as given in the original description, otherwise they are a good match for the figures. The distinctive characters of this variety appear to be the location of the endocarp in the lower half of the phalange, and the rather shallowly marked and only slightly convex apex of the phalange. The leaf is 1.7 m. long, about 8.5-9 cm. broad at the base tapering gradually to a long caudate apex, the marginal teeth being widely remote on the upper half. The syncarp is ovoid, about 28 cm. long and 20 cm. in diameter.

Brass 1228, which on account of its immature fruit Martelli determined simply as *P. tectorius* forma, seems very much like this material. Likewise the following collection either belongs here or is very closely related: BRITISH NEW GUINEA, Western Division, Daru Island, *Brass* 6255, March, 1936, abundant in the substage and conspicuous in the savannah-forests (tree 7-8 m., branching into a flattish spreading open crown; old trees sometimes supported on a compact bunch of stilt-roots \pm 20-30 cm. long, stem covered with slender upturned adventitious rootlets; leaves \pm 1.5 m. long, 5 cm. broad (across central channel), tapered to a long fine point, few prickles above the basal 30 cm.; fruit-heads solitary on branches, pendent amongst the leaves; drupes green).

Pandanus tectorius Soland. var. **novo-guineensis** Martelli, Webbia 4(1): 34. 1913, 4(2): 413, t. 43, f. 4-5. 1914.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8648, January, 1937, poorly drained savannah-forests (mature trees rare, seedling plants very abundant in places; trees 4-5 m. high, supported on a bunch of crowded prop-roots 20-30 cm. long; stem branched into an open crown; leaves somewhat glaucous below; fruit-heads orange-red, ovoid, typically about 18×14 cm.).

Type from Northeastern New Guinea.

The phalanges of our material are 5.5 cm. long, 3 cm. broad and 6-8-loculed. The leaves are ± 1.4 m. long and 3-4 cm. broad, gradually tapering from the slightly dilated base to a long caudate apex. Since we have only Martelli's figures as a basis for comparison, this seems to be the best disposition of this collection at present.

***Pandanus tectorius* Soland. var. *suvaensis* (Martelli) comb. nov.**

P. odoratissimus Linn. f. var. *suvaensis* Martelli, Univ. Calif. Publ. Bot. 12: 332, t. 41, 1930.

SOLOMON ISLANDS: Bougainville Island, Karngu, Buin, *Kajewski* 2299, October 27, 1930, common close to the seashore (a *Pandanus* up to 10 m. high; leaves up to 2.5 m. long with serrate margin and midrib beneath; fruit a large cone 30 cm. long, 26 cm. in diameter; seeds yellow-green imbedded in a white center, the diameter of which is 8 cm. When ripe, the juice of the fruit is pressed out and drunk by the natives).

Type from the Fiji Islands.

The phalanges of our material so closely match those of the type-collection that they must surely belong to the same entity.

***Pandanus upoluensis* Martelli, Bishop Mus. Occas. Pap. 10(13): 15, t. 6, 7, 1934.**

Pandanus tectorius var. *upoluensis* Martelli in Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wissensch. Wien 85: 230, 1910, 89: 489, 1913 (Bot. Zool. Ergeb. Wissensch. Forsch. Reise Samoa- New Guin. Salomon Ins. 3: 56, f. 4, 1910, 5: 47, 1913), Webbia 4(1): 35, t. 17, f. 11-13, 1913, 4(2): t. 18, f. 4-19, 1914.

SOLOMON ISLANDS: Ulawa Island, *Brass* 2994, October 8, 1932, common on rocky foreshores (stems usually solitary, on a supporting mass of stout prickly stilt-roots; old trees 10 m. or more tall; branches numerous from the upper part of the stem, leaf-scars obscure and prickles blunt; leaves short, crowded, glaucous, very stiff; fruit-heads terminal, on a stiff peduncle, erect or nearly so, 3-angled, about 17 cm. long, 13 cm. in diameter; drupes connate in clusters. Leaves used in the manufacture of plaited arm-bands).

Type from Samoa; previously reported from New Pommernia and the Solomon Islands.

Pandanus Brassii Martelli, Jour. Arnold Arb. **10**: 139, *t.* 18, *f.* A. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Dagwa, *Brass* 5933, February 15, 1934, commonly scattered over open grass-slopes, also forming large areas of almost pure forest, at 45 m. alt. (tree 4–5 m., freely branched into a spreading compact crown; prop-roots rarely developed, numerous very small upturned appressed adventitious roots on the trunk; syncarps very variable in size, solitary, pseudo-terminal, erect when young, pendent towards the ripening stage; drupes connate in clusters, red when ripe; leaves \pm 1.5 m. long, both surfaces glaucous towards the base).

The phalanges differ from those of the type only in being a little smaller and a little younger; the leaf-margins have a few more dentations towards the apex: these are surely not significant differences.

Pandanus pseudopapuanus Martelli, Webbia **4**(1): 28. 1913, **4**(2): 407, *t.* 33, *f.* 1–3. 1914.

Pandanus papuanus sensu Warburg, Pflanzenr. **3**(IV.9): *f.* 13H, *J.* 1900; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 160. 1900, non Solms-Laub.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5847, January 31, 1934, plentiful in riverbank rain-forest; Lake Daviumbu, Middle Fly River, *Brass* 7758, September, 1936, comparatively moist hollows in rain-forest; Palmer River, 2 miles below Black River Junction, *Brass* 7071, June, 1936, scattered in forest substage on low creek-banks, at 100 m. alt.

Type from Northeastern New Guinea.

This is a very tall tree (up to 25 m. or more) with a large spreading crown, leaves gradually acuminate, \pm 2.5 m. long, 8–10 cm. broad, and solitary, pendent oblong-ovoid fruit-heads 30–35 cm. long and 15–21 cm. in diameter.

Pandanus Solms-Laubachii F. Muell. Bot. Zeit. **45**: 218. 1887, Second Cens. Austral. Pl. **1**: 202. 1889; Warburg, Pflanzenr. **3**(IV.9): 46, *f.* 13, *G.* 1900; F. M. Bailey, Queensl. Fl. **5**: 1689. 1902, Comprehens. Cat. Queensl. Pl. 576. 1913; Martelli, Webbia **4**: 31, *t.* 5, *f.* 5–6. 1913.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7931, September, 1936, scattered over wet grass plains (tree 5–7 m. high, freely branched into an open crown and supported on a few short crowded prop-roots; stem and branches gray, more or less covered with short upturned adventitious roots; leaves somewhat glaucous; fruit-heads

bluntly ovate, up to \pm 20 cm. long, 15 cm. diameter; ripe syncarpis orange-red).

The phalanges of this collection are so very much like those of *Amundsen*, November, 1924, Mourilyan, North Queensland, and *White 3330*, cult. Botanic Gardens, Brisbane, that we have little hesitation in assigning it (*Brass 7931*) to this Australian species. *Pandanus Solms-Laubachii* was questionably reported from New Guinea by Warburg, l. c. The distinctive characters are the lateral stigmas, the flattened apices and the sulcate sides of the drupes, and the \pm fuscous teeth of the margins of the leaves.

Pandanus Kajewskii sp. nov. § *Kcura*.

Pl. II, f. 3.

Arbor usque ad 8 m. alta. Foliis 7.5 m. latis, subtus longitudinaliter venosis; margine remotiuscule denta'ta, dentibus brevibus, acutis; costa media remote denticulata. Syncarpio 27 cm. longo, 21 cm. diametro; phalangibus 10 cm. longis, 3.5–4.5 cm. latis, in tertia parte superiore liberis, basi angustatis (1.5 cm. latis), angulatis, ibique inter se divaricatis, lateribus latis subplanisque; loculis 10–16, apice pyramidatis, sulcis profundis separatis, vertice parvo obliquo terminatis; stigmatibus subverticali, omnibus centropiscopis; endocarpio ligneo vel osseo in parte mediana posito, superne irregulariter sinuoso vel lobato; mesocarpio supero medullosa-fibroso.

SOLOMON ISLANDS: Bougainville Island, *Kajewski 1757*, April 23, 1930, Kupei gold field, common in rain-forest, at 1000 m. alt. (a *Pandanus* up to 8 m. high with large typically cone-shaped fruits 27 cm. long and 21 cm. in diameter).

Since the leaf of the specimen at hand is only 1.8 m. long, and 6 cm. broad at the broken end, with its greatest width around 7 cm., it is probably safe to assume that the leaves are around 3 m. long. The widely spreading, large and free apices of the phalanges are the distinguishing characters of this species. The sides are smooth and angular, the top is divided into a group of 10–16 pyramids about 1 cm. long. The stigmas are lateral and face toward the center of the phalange.

Section HOMBRONIA

Pandanus tetrodon (Gaudich.) Balfour f. Jour. Linn. Soc. 17: 63. 1878; Kanehira, Bot. Mag. Tokyo 52: 236, f. 70. 1938.

Barroetia tetrodon Gaudich. Bot. Voy. Bonite t. 13, f. 1–8. 1842.

Hombronia edulis Gaudich. op. cit. t. 22, f. 17. 1842.

Barroetia Gaudichaudii Brongn. Ann. Soc. Nat. Ser. VI. 1: 264. 1875, nomen nudum.

Pandanus Hombrovia F. Muell. Victoria Nat. 143. 1890 (repr. Bot. Centralbl. 45: 123. 1891).

Pandanus compressus Martelli, Webbia 1: 363. 1905, 4: 10, t. 8, f. 14-15. 1913.

Pandanus Yamagutii Kanehira, Bot. Mag. Tokyo 50: 544, f. 54. 1936.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2786, September 1, 1932, common on raised coral foreshore. Also observed on Ulawa Island (tree up to 15 m. tall with shortly spreading branches usually in whorls of three. Trunk supported on a few very stout aerial roots armed with scattered short broad-based prickles. Leaves very pale, the upper part twisted at right angles with the base. Those of an adult tree about 1.5 cm. long, 15 cm. broad. Fruit-heads very glaucous, globose, terminating the branches, pendent on a three-angled bent peduncle 50-60 cm. long. Drupes free, 4-6-angled, very large).

This specimen seems unquestionably to represent *P. tetrodon* (Gaudich.) Balfour f. as recently and correctly interpreted by Kanehira. The phalanges (immature), although only about the size of those in Kanehira's figures, correspond in all details to this species.

Pandanus hystrix Martelli, Bull. Soc. Bot. Ital. 1904: 300. 1904, Webbia 4(1): 16, t. 14, f. 1. 1913.

BRITISH NEW GUINEA: Palmer River, two miles below Black River Junction, at 100 m. alt., *Brass* 7007, June, 1936, a forest substage species of the higher riverbanks and damp hollows between ridges (stilt-roots enormously developed, cylindric, widely spread and supporting the short branched stem in a reclining position 12-14 m. above the ground; stem and stilt-roots armed with scattered short thorns; leaves pliant, glaucous below, 1.2-1.4 m. long, 6-6.5 cm. broad on fruiting branches; fruit-heads solitary, pendent, ovoid-globose, on an average specimen 26 cm. long, 21 cm. in diameter; exposed portion of syncarp glaucous green, lower parts pink; inflorescence of staminate trees pendent below the branches, 80-100 cm. long; bracts soft, white, concave, with keeled apex).

Type collected by *D'Albertis*, Fly River.

Although Martelli's description is very brief, it seems as if *P. hystrix* is the entity to which *Brass* 7007 belongs. The syncarp is composed of obovate-cuneate and for the most part strongly compressed phalanges arranged in vertical rows. These phalanges are free in the upper fourth part and granular. The locules of the lateral ones are mostly 2-seriate (occasionally 1-seriate as in the type), but those of the apical phalanges are in irregular groups as in section *Kewia*. The stigmas are chiefly horizontally depressed. The endocarp is approximately in the middle of the phalange; the upper mesocarp is medullose-fibrous with rather

coarse fibres. The leaves are scarcely dilated at the base, acute at the apex, and have the margins and the midrib beneath clothed with close and finely aculeiform teeth.

The staminate inflorescence is a branching spadix, each branch being subtended by a broadly ovate spathe (7–25 cm. or more long), and bearing numerous (sometimes branching) columns or branchlets. At the ultimate tips of these the stamens are borne in an irregularly palmate or digitate manner. The anthers are \pm 2 mm. long, oblong-ovate and submuticous.

Pandanus Balenii Martelli, *Webbia* 2: 432. 1907, 4(1): 7. 1913, 4(2): t. 21, f. 1–5. 1914; White, *Proc. Roy. Soc. Queensl.* 34: 14. 1923.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3948, 3955, May, 1933, fairly common in rain-forest, at 500 m. alt.

Type from Dutch New Guinea.

The phalanges of *Brass* 3955 (those of *Brass* 3948 are immature) so closely coincide with Martelli's figures of *P. Balenii* that it does not seem as if they could belong to any other species. However, it is essential to add that our collections show some variation from the original description. *Brass*'s field-notes indicate a plant with unbranched stem less than 10 cm. long, leaves up to 2.65 m. long, 7.4–8.5 cm. wide, and a syncarp 17 cm. long, 12 cm. diameter, dark purple-brown outside, bright scarlet within.

Pandanus limbatus sp. nov. § *Hombrovia*.

Pl. II, f. 5.

Caulis 1.5–2 m. longus, 6–7 cm. diametro, non ramosus. Foliis circiter 1.7 m. longis, \pm 7 cm. latis, versus basin paullo angustioribus, ad basin paullo dilatatis, apice concavis; in pagina inferiore, basi excepta, longitudinaliter venulosa; costa media subtus prominente, in parte apicali breviter subdistanterque serrata; margine remotiuscule subserrato; plicis lateralibus apicem versus remote serrulatis. Syncarpio pseudo-terminali, pendulo, globoso, 12.5 cm. diametro; phalangibus drupis 2–4 inter se in unica serie transversali coalitis compositis, numerosis, in parte inferiore connatis, cuneato-complanatis, 4.5–5 cm. longis, 2.5–3(–4) cm. latis, 7–9 mm. crassis; phalangium pileo e pileis partialibus druparum composito; pileis 1.5–1.7 cm. longis, pyramidatis, tetra–pentagonis, apice truncatis; stigmatibus verticalibus ad latus pyramidale sito, latiuscule oblongo; endocarpio osseo, partem mediam transverse repletente; mesocarpio supero fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7228 (TYPE), July, 1936, occasional on banks of small streams in the ridge-forests, at 100 m. alt. (stem 1.5–2 m. long, 6–7 cm.

diameter, unbranched and without stilt roots; leaves concave towards the apex; fruit-head pseudo-terminal, pendent amongst the leaves; drupes syncarpous, apex purple-green, basal parts red).

This species is very much like *P. Balenii* Martelli, differing in its much longer stem, globose syncarp, and longer pyramidal drupe-heads. The latter appear to slope gradually toward the apex rather than being rounded in the lower part and more abruptly narrowing towards the apex.

Section BRYANTIA

***Pandanus nemoralis* sp. nov.** § *Bryantia*. Pl. I, f. 15.

Planta gracilis, 3-4 m. alta. Foliis chartaceis, glaucis, \pm 65 cm. longis, in dimidio superiore \pm tessellatis, planis, 5.5-7 cm. latis, in dimidio inferiore \pm plicatis, sensim angustis, 4 cm. latis, ad basin paullo dilatatis, apice abrupte acuminato-caudatis, cauda \pm 4 cm. longa, margine versus basin denticulato-serrato, sursum inermi versus apicem serrato; plicis lateralibus inermibus; costa media acuta, versus apicem sparse serrata. Inflorescentia terminali; syncarpiis circiter 12, spicatum dispositis, quoque syncarpio spatha propria; spathis inferioribus foliaceis, \pm 32 cm. longis, \pm 5 cm. latis, acuminato-caudatis, superioribus multo minoribus, breviter acuminatis vel acutis. Syncarpio infero 5 cm. longo, 5 cm. lato, 2 cm. crasso, subpatelliformi, supero multo minore; drupis 8-10 mm. longis, 5 mm. et ultra latis, oblongis, obtuse angulosis, pileo convexo, pseudo-costato, vertice depresso, stigmati in disco explanato, 2-2.5 mm. lato, centrali vel subexcentrico; mesocarpio supero concavo, 1 mm. et ultra longo, loculis 1-2, endocarpio 3.5 mm. longo; mesocarpio infero concavo.

SOLOMON ISLANDS: Florida Islands (N'Gela), Olevuga Island, *Brass* 3489 (TYPE), January 16, 1933; Ysabel Island, Tasia, *Brass* 3279, December 5, 1932, common in lowland rain-forests (very slender erect stilt-rooted tree 3-4 m. tall; stems not exceeding 5 cm. in diameter; leaves soft in texture, crinkled and much recurved, somewhat glaucous on both sides toward the base; inflorescence terminal; bracts persistent).

The thin leaves narrowed toward the base and unarmed except close to the base and the apex, and the broad suborbicular stigmatic disk are the distinguishing characters of this species. In drying, the ends of the fibres of the upper mesocarp cause the shrunken pericarp to appear somewhat ribbed or striate. The syncarp is somewhat patelliform; the receptacle is much flattened so that each syncarp fits the axis of the inflorescence very compactly. The flattened syncarp is also found in *P. dinagatensis* Merr. and *P. palocensis* Elmer, but *P. nemoralis* is readily separated from these by the characters enumerated above.

Pandanus Rechingeri Martelli, Denkschr. Math.-Naturwissensch. Kl. Akad. Wissensch. Wien 89: 489, 1913 (Bot. Zool. Ergeb. Wissensch. Forsch. Reise Samoa- New Guin. Salomon Ins. 5: 47, 1913), Webbia 4(1): 29, 1913, *nom. nud.*, 4(2): 425, t. 27, f. 5, 1914, *descr.*

SOLOMON ISLANDS: Guadalcanal, Berande, *Brass* 2552, July 23, 1932, an estuarine species; Ulawa Island, *Brass* 2942, October 4, 1932, common in a small swamp; Ysabel Island, Tasia, *Brass* 3275, December 5, 1932, common in rain-forests fringing the coast; Meringe, *Brass* 3175, November 22, 1932, rocky foreshores.

Brass's field-notes indicate a tree 2-7 m. high, supported on stilt-roots; leaves very numerous, 2-2.5 m. long, spreading and drooping; ♀ inflorescence on short divaricate lateral leafy branches (in *Brass* 3275 a terminal pendent raceme); ♂ inflorescence inclosed in white (or with green tips) bracts. There is considerable variation in the width of the leaf, depending on whether it is part of the leafy lateral branch bearing the infructescence or whether it is on the vegetative part of the plant. The staminate spikes are dense, the stamens racemose on the very short (3-4 mm. long) columns or branchlets. The filaments are exceedingly short (0.3 mm. long) and the oblong obtuse anthers are about 1.5 mm. long.

Martelli has already pointed out how very closely this species resembles *P. polycephalus* Lam. The latter has narrower drupes with more nearly pyramidal free apices.

In Webbia Martelli does not mention the earliest publication of the name *Pandanus Rechingeri*. Probably he had anticipated that his treatment in Webbia would be published earlier; the name is listed only in Webbia 4(1), with a reference to the description in 4(2), dated 1914.

Pandanus exiguus sp. nov. § *Bryantia*

Pl. I, f. 14.

Planta vix 2 m. alta; trunco non ramoso, sparse aculeato, in dimidio superiore folioso; foliis inflorescentiam proximis angustis, 70-76 cm. longis, 1.2-1.4 cm. latis, apice sensim attenuatis, basi dilatatis, amplexicaulibus, margine in parte basilari nudo, sursum remotiuscule dentato-serrato, supra plicis lateralibus versus apicem irregulariter sparseque denticulatis, subtus costa media acuta, remote denticulata. Spathis \pm 12 cm. longis, ovato-lanceolatis, navicularibus, margine costaque media breviter dentato-serratis. Syncarpio solitario, erecto, oblongo, 6-7 cm. longo, 3-3.5 cm. diametro, pedunculato; pedunculo brevi; drupis coccineis, circiter 13 mm. longis, 4 mm. latis, irregulariter pentagonis, prismaticis, cuneato-oblongis, numerosis, in dimidio inferiore connatis, apice breviter lateque pyramidatis, angulatis; stylo brevissimo, discum stig-

matiferum subrotundum vel hippocrepiforme gerente; endocarpio osseo, 3 mm. longum, mesocarpium supero cavo, 4 mm. longo, infero fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7070 (TYPE), June, 1936, abundant in forest undergrowth round the edges of a swampy depression and extending to the surrounding low ridges, at 100 m. alt. (plant less than 2 m. high, stem unbranched, raised on stilt-roots 20–30 cm. long, the upper half leafy; a few upturned prickles on the stem and stilt-roots; fruit-head erect amongst the leaves, 6–7 cm. long, 3–3.5 cm. diameter; drupes red).

The pericarp contains a reddish dye which colors paper in contact with the broken surface of the drupes.

Pandanus leiophyllus Martelli, Webbia, 4(1): 21, *t.* 17, *f.* 6–10. 1913, 4(2): 422. 1914.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7636, plentiful in rain-forests; Lower Fly River, east bank opposite Sturt Island, *Brass* 8052, rain-forest, common on river-banks inundated by spring tides, occasional on drier ground, *Brass* 8208 (♂); Western Division, Upper Wassi Kussa River (left branch), *Brass* 8617, rain-forests, restricted to river-banks.

The above collections appear to fit Martelli's description and figures 6, 7, and 10; at the same time it should be noted that none of the specimens at hand have the horn-like lateral processes shown in figures 8 and 9. Mr. Brass's field-notes show this to be a tree 7–12 m. tall with short branches scattered up the stem, not forming a crown as in most species; the leaves are arranged in very definite spirals and leave conspicuous leaf-scars on the branches; the fruit-heads are solitary, semi-erect amongst the leaves, and completely enclosed in dry bracts which rupture about the middle when the fruit is ripe; the drupes are soft, fleshy, and red (when ripe) with a hard yellow apical covering. The syncarps are almost globose.

The staminate inflorescence is a branching spadix, each branch being subtended by a concave narrowly ovate spathe. The outer spathe is 22 cm. long, 8 cm. broad, with margins and midrib spinulose-dentate, the apex caudate; the inner is about 12 cm. long and acutish. Each branch is fairly compact with staminiferous branchlets or columns \pm 1 cm. long, the short filaments (0.2–0.4 mm.) bearing abruptly caudate anthers (\pm 2 mm. long).

Pandanus meniscostigma sp. nov. § *Bryantia*. Pl. II, f. 2.

Planta parva, usque ad 5 m. alta, saepe non ramosa; trunco laevi, pallide brunneo, sparse aculeato, aculeis circiter 2 cm. longis. Foliis

(nonnumquam in trunco inferiore persistentibus) 2.4–2.8 m. longis, 4.5 cm. latis, apice sensim acuminato-caudatis, basi paullo dilatatis, margine acute dentato-serrato; plicis lateralibus versus apicem irregulariter sparseque dentatis; costa media acuta in dimidio superiore denticulata. Syncarpio oblongo-ovoideo, solitario, maturitate usque ad 35 cm. longo, versus basin 8 cm. diametro, sursum versus apicem 6 cm. diametro; drupis (immaturis) 1.5 cm. longis, numerosis, connatis, oblongis, basi latiusculis; pileo apicali libero, 5 mm. longo, \pm hexagono, pyramidato-subrotundato, in vertice explanato; stigmatate lato (0.5 mm.), hippocrepiformi, plano; mesocarpio fibroso, endocarpio osseo, in parte infera drupae sito.

BRITISH NEW GUINEA: Central Division, Laloki River, Rona, *Brass* 3650 (TYPE), April, 1933, at 450 m. alt., common in rain-forests (slender, often unbranched tree, up to 5 m. tall, supported on a close mass of thick prop-roots 20–30 cm. long. Stem smooth, pale brown, armed with scattered prickles about 2 cm. long. A number of tattered old leaves often persistent on the lower stem. Leaves glaucous beneath, 2.4–2.8 m. long, about 4.5 cm. wide on unbranched trees, much shorter when the tree is branched. Fruit-head, up to 35 cm. long, 8 cm. in diameter near the base, tapering to 6 cm. diameter at 4 cm. from the apex, solitary, lateral amongst the leaves, drooping as the fruit ripens; drupes orange-brown when ripe).

This species suggests *P. leiophyllus* Martelli in the caudate leaf-tips as well as in the distinctive apical portion of the drupes. The latter, however, are more pyramidal in *P. meniscostigma* and the apex is merely a flattened surface marked by the hippocrepiform or crescent shaped stigmatic surface; whereas, in *P. leiophyllus* Martelli, the apex is somewhat depressed and constricted immediately below the broad stigmatic disk, the upper surface of which closely resembles that of our species.

***Pandanus paludosus* sp. nov. § *Bryantia*.**

Pl. I, f. 16.

Planta 5–7 m. alta, trunco ramoso. Foliis (in specimine viso) 70–85 cm. longis, medio circiter 6 cm. latis, deorsum ad basin dilatatum sensim angustis, apice acutis, chartaceis, margine minute adpresseque denticulato; costa media prominula, in parte superiore adpresse denticulato-serrata; plicis lateralibus versus apicem parce minuteque denticulato-serratis. Syncarpio solitario, fere erecto vel erecto, ovoideo, 10 cm. longo, 7–8 cm. diametro, pedunculato (pedunculo trigono usque ad 10 cm. longo) spathis chartaceis imbricatis induto; drupis numerosissimis, adpressis, confertis vel subconnatis, prismatico-clavatis, irregulariter pentahexagonis, 6 cm. longis, 4–5 mm. latis, basi acutis, apice pileatis, pileo

breviter pyramidato, anguloso; stylo brevissimo, apice in discum latum (2-2.5 mm.) stigmatiferum subrotundum vel subhippocrepiformem explanato; endocarpio cuneato-oblongo, 13 mm. longo; mesocarpio supero cavo, 9 mm. longo, infero fibroso, 8 mm. longo.

SOLOMON ISLANDS: Ysabel Island, Garona, *Brass 3375* (TYPE), December 22, 1932, common in swampy lowland rain-forests (erect tree 5-7 m. tall; stem much branched, supported on prop-roots; a few very small blunt prickles on prop-roots, stem and branches; leaves numerous, down-curved; inflorescence lateral amongst the leaves, erect or almost so; drupes whitish, at least in the growing stage; bracts green).

***Pandanus buinensis* sp. nov.** § *Bryantia*. Pl. II, f. 6.

Planta usque ad 7 m. alta. Foliis (in specimine imperfectis, ad apicem fractis) chartaceo-coriaceis, circiter 1 m. longis, 6-6.5 cm. latis, basi breviter dilatatis, ibique inermibus et amplectentibus, margine in parte superiore minutissime serrato, deorsum dentato-serrato; costa media subtus prominula, in parte superiore minutissime serrata, deorsum remote inconspicueque dentata. Syncarpio solitario, breviter elliptico, 16 cm. longo, 14 cm. diametro, pedunculato; spathis imbricatis, exterioribus 25 cm. longis, interioribus 18 cm. longis, navicularibus; drupis numerosissimis, connatis, linearibus, pentagonis, prismaticis versus basin \pm attenuatis, 4 cm. longis, 2-3 mm. latis, pileo apicali circiter 6 mm. longo, libero, pyramidato; stylo brevissimo; stigmatibus 2-3 mm. lato, apicali vel subexcentrico, in margine irregulariter crenato-sinuato explanato; mesocarpio supero 1.7-1.8 cm. longo, meduloso, infero fibroso; endocarpio tenui, infra medium drupae sito, 11 mm. longo.

SOLOMON ISLANDS: Bougainville Island, Karngu, Buin, *Kajewski 2303* (TYPE), October 30, 1930 (a common *Pandanus* growing up to 7 m. high in the shade of the primeval rain-forest; leaves about 1 m. long, the sheath (where it joins the stem) light-green suffused with pink. Drupes cream-colored with dark brown stigmas).

The general structure of the drupes is similar to that found in the fruit of *P. leptocarpus* Martelli, but the apices in the two are strikingly different. That in our species suggests some likeness to that of *P. discostigma* Martelli, but the stigmatic disk in the latter is much broader in proportion to the size of the drupe.

***Pandanus subumbellatus* Solms-Laubach, Ann. Jard. Bot. Buitenz. 3: 96, t. 16, f. 4-6. 1883, Bot. Jahrb. 9: 192. 1888, in K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 17. 1889; Warburg, Pflanzenr. 3(IV.9): 69. 1900; Martelli, Webbia 4(1): 32. 1913, 4(2): t. 26, f. 6-11. 1914.**

NORTHEAST NEW GUINEA: Morobe District, Kulunhipi, *Clemens* 6638, June 7, 1937, at \pm 1600 m. alt.; Yoangen, *Clemens* 6593, June, 1937, at 1250 m. alt.

These are immature specimens which seem more nearly to fit the description of this species than any other.

Pandanus Cominsii Hemsl. in Hook. Icon. **27**: *t.* 2654. 1900; Martelli, Bot. Jahrb. **49**: 66. 1912, *Webbia* **4**(1): 10. 1913, **4**(2): *t.* 26, *f.* 20. 1914, Jour. Arnold Arb. **12**: 269. 1931, **13**: 114. 1932; Kanehira, Bot. Mag. Tokyo **49**: 356, *f.* 31. 1935, Enum. Micr. Pl. 260. 1935, Bot. Mag. Tokyo **50**: 544. 1936.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2600, common in coastal rain-forests (in clumps about 8 m. high; stems slender, branched near the top, supported on numerous stout prickly prop-roots; leaves numerous, averaging about 1.65 m. \times 7 cm., those of young trees much larger; leaf deeply grooved at base, the edges of the groove soon forming two prominent ridges which extend to the apex; fruit surrounded by a number of leafy bracts, the inner closely investing the fruit, solitary at the ends of the branches, 3-angled, 40-50 cm. long, about 8 cm. diameter; drupes free, red, on a bright yellow receptacle).

New Hebrides, Bismarck Archipelago, Caroline Islands.

This specimen is a good match for *Kajewski* 471 (named by Martelli) from the New Hebrides.

Pandanus Hollrungii Warburg, Pflanzenr. **3(IV.9)**: 71. 1900; Martelli, Bot. Jahrb. **49**: 66. 1912, *Webbia* **4**(1): 16. 1913, **4**(2): *t.* 26, *f.* 21. 1914.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7118, June, 1936, apparently restricted to poorly drained soil on flat ridge-tops, at 100 m. alt. (small species 4-5 m. high; stem 6-8 cm. thick, supported on a few prop-roots \pm 30 cm. in length, and producing 2 or 3 leafy branches; leaves long and slender, \pm 2.5 m. \times 4.5 cm., deeply channeled, glaucous underneath; fruit-heads solitary, semi-erect among the leaves, 3-angled, cylindric, \pm 24 cm. long, 7 cm. diameter; drupes red).

As regards the recent reduction (Kanehira, Bot. Mag. Tokyo **50**: 544. 1936) of *P. Hollrungii* Warb. and *f. caroliniana* Martelli to *P. Cominsii* Hemsl., we also have no authentic material for comparison. Probably forma *caroliniana* is a different entity from the species, hence it need not be considered here. We agree with Warburg that *P. Hollrungii* strongly suggests *P. Cominsii* Solms-Laub, but differs in the apices of the drupes. In *P. Hollrungii* the apical cap is convex, the stigmatic disk practically

sessile at the centre. In *P. Cominsii*, on the other hand, the apical cap is distinctly pyramidal, the stigmatic disk crowning the narrow and shortly drawn out apex.

Pandanus conoideus Lam. Encycl. 1: 372. 1785 (excl. β .); Balfour f. Jour. Linn. Soc. Bot. 17: 44. 1878; Warburg Pflanzenr. 3(IV.9): 69. 1900; Merr. Interpret. Herb. Amboin. 81. 1917.

Pandanus ceramicus Rumph.; Kunth Enum. 3: 98. 1841; Solms-Laub. Bot. Jahrb. 13: 257. 1891; Martelli, Webbia 4(1): 10. 1913, 4(2): t. 26, f. 12-16. 1914.

Bryantia butyrophora Webb in Gaudich. Voy. Bonite, t. 20. 1842.

Pandanus butyrophorus Kurz, Jour. As. Soc. Bengal 38(2): 150. 1869.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5463, Nov. 8, 1933, at 1450 m. alt.; planted by natives in gullies and ravines close to their gardens (tree 3-5 m. high, branched, raised on a few prickly stilt-roots; stem and branches armed with upturned prickles; leaves of mature trees always much damaged by insects; syncarp somewhat triangular in cross section, an average specimen measuring 42 cm. long, 10.5 cm. diameter; drupes red on an orange-red receptacle). NORTHEAST NEW GUINEA: Sattelberg, *Clemens* 445, October 14, 1935, hill jungle, at \pm 900 m. alt.

Although we have no material with which to compare this specimen, the drupes are a good match for Martelli's figures of this species.

Pandanus Julianettii Martelli, Webbia 2: 433. 1907, 4(1): 18, t. 14, f. 6-7. 1913. Pl. II, f. 8.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5461, November 8, 1933, planted in the forests on clearings made especially for the purpose, at 1500 m. alt. (trees very tall and much branched; supported on thick slightly fluted prop-roots (up to 13-14 m. long) armed with scattered prickles. Specimens from an average large tree about 100 feet high. Leaves (perhaps 3 m. long, 10-11 cm. broad) drooping; apical portion split down the middle from a very early age, underside glaucous. Syncarp pendent on a long peduncle covered with numerous broad tracts, an average specimen 35.5 cm. long, 24.5 cm. diam.; apex of the drupes brown, exposed sides glaucous. This (*Hina*) is one of the two *Pandanus* spp. grown by the natives for the edible seeds. The other species, called *Mondoa*, was past fruiting and could not be collected. The seeds of both are known as *Katora*; those of *Hina* having a flavor somewhat like coconut but somewhat sweeter. The leaves of both species make a very durable house-thatch).

Although the description of this species is very brief owing to the fragmentary condition of the type-drupes, we are convinced that *Brass* 5461

belongs here. The clavate angular drupes are 2.5–2.7 cm. in diameter, free about 2.5 cm. below the convex apex, and terminate mostly with a slightly depressed area, the suborbicular stigmatic disk being excentric and slightly oblique. The species seems to us to belong to the section *Bryantia* rather than to the section *Hombrovia*.

Section LOPHOSTIGMA

Pandanus Archboldianus sp. nov. § *Lophostigma*. Pl. I, f. 21.

Planta erecta, 8–10 m. alta; radicibus aereis aculeatis, erectis, 2–2.5 m. altis; trunco in parte terminali ramoso, ramis 2–3, brevissimis, copiose foliosis. Foliis flexilibus, circiter 3 m. longis, \pm 11 cm. latis, abrupte acuminatis, subtus in parte superiore longitudinaliter venulosis, in parte inferiore cum venis evanescentibus; plicis lateralibus obtusis; costa media subtus acuta, apicem versus serrulata; margine serrato-dentato, versus basin dentibus brevibus crebrisque, sursum remotiusculis, in parte apicali minutis crebrisque. Syncarpio solitario, pendulo, aurantiaco-roseo, 32 cm. longo, usque ad 21.5 cm. diametro; drupis connatis, numerosissimis, 6 cm. longis, basi 3–5 mm. latis, in parte apicali libera \pm breviter pyramidalis, 2.5–3 mm. longis, compresse penta – hexagonis; stylo in vertice plano, in acumen breve lateraleque producto; stigmatibus laterali infra acumen styli; endocarpio fere ad basin drupae sito, osseo, circiter 16 mm. longo; mesocarpio fibroso.

BRITISH NEW GUINEA: Central Division, Mafalu, *Brass 5366* (TYPE), Oct. 24, 1933, mountain crest forest, at 1700 m. alt. (erect, 8–10 m. high; trunk supported on a few, almost erect, prickly prop-roots 2–2.5 m. high. Small crown of 2 or 3 very short branches completely covered with broad flexible leaves about 3 m. long; solitary large pendent orange-pink syncarp, 32 cm. long with a maximum diameter of 21.5 cm.; bracts broad).

Pandanus aggregatus sp. nov. § *Lophostigma*. Pl. I, f. 13.

Plantae gregariae, 12–14 m. altae; trunco radicibus aereis aculeatis suffulto, aculeis brevibus, obtusis. Foliis \pm 3 m. longis, 7.5–8.5 cm. latis, sensim acuminatis, subtus in parte superiore longitudinaliter minuteque venosis, in parte inferiore cum venis evanescentibus; plicis lateralibus inconspicuis; costa media subtus ad basin \pm obtusa inconspicuaque, sursum dentato-serrulata; margine dentato-serrato, dentibus in parte basilaribus subpatulis, sursum ascendentibus, brevibus, acutis, apice rufescentibus. Syncarpio solitario, pendulo, ovoideo, (in specimine viso) 30 cm. longo, 21 cm. diametro; drupis confertis, linearibus, prismaticis, penta – hexagonis, \pm 5.5 cm. longis, 6–8 mm. latis, deorsum paullo

angustioribus, in parte libera convexo-pyramidatis, apice plano vel paullo depresso et in stylum breve lateraliter producto, stigmatе bilobo, laterali, transverso; endocarpio fere ad basin drupae sito, osseo, 11 mm. longo, mesocarpio fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6974 (TYPE), June, 1936, abundant in substage layer of riverine forests, at 100 m. alt. (forms clumps 12–14 m. tall, comprised of several trees rising from a small compact group of erect prop-roots armed with scattered short blunt prickles; stem branched or unbranched; leaves \pm 3 m. long, glaucous underneath, especially towards the base; fruit-heads pendent, solitary amongst the leaves, ovate (collected specimen 30×21 cm.); drupes purple at the apex, the lower fleshy parts scarlet; a remarkable rosette effect is produced by the drupes which ripen, a few at a time, and assume an erect position on the receptacle before they fall to the ground).

This species closely resembles *P. Archboldianus*. It differs, however, both in fruit- and foliar characters. The drupes, although very closely appressed, are not so strictly connate, and the free apex is a little longer than in the latter species. The leaves are relatively narrow and taper gradually to an acuminate apex; the margin and the upper midrib are strongly serrate-dentate. In *P. Archboldianus*, on the other hand, the leaves are relatively broad and taper abruptly to an acuminate tip, the marginal serrations (above the basal portion) are remote and more closely appressed.

Pandanus microdontus sp. nov. § *Lophostigma*. Pl. I, f. 18.

Planta 3–4 m. alta, non ramosa. Foliis \pm 3 m. longis, 7.5–8.5 cm. latis, basi paullo dilatatis, apice sensim attenuatis; plicis lateralibus vulgo nudis; costa media subtus acuta, in parte superiore denticulato, dentibus suberectis, deorsum nuda; margine serrato-denticulato, dentibus acutis, subulatis. Syncarpio \pm 25 cm. longo, 8–8.5 cm. diametro, oblongo; spathis plurimis, confertis, navicularibus; drupis roseis, dense adpressis, numerosissimis, fere linearibus, \pm prismaticis, penta – hexagonis, \pm 2 cm. longis, 4 mm. latis, apice breviter pileatis; pileo 3 mm. longo subfacile secedente, obtuse angulato, subconcavo cum arcola centrali paullo elevata vel subconcava; stylo subexcentrico horizontali vel adscendente, dentiformi vel flabelliformi; stigmatе laterali; endocarpio 7 mm. longo, osseo, oblongo, sursum subconico; mesocarpio fibroso, supero 5–7 mm. longo.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7695 (TYPE), September, 1936, occasional in rain-forests (stem unbranched, 3–4 m. long, supported on a few erect, crowded stilt-roots

20–30 cm. in length; fruit-heads pseudo-terminal, \pm 24 cm. long, 8.5 cm. diameter; drupes pink).

This species closely approaches *P. Kivi* Martelli in the character of the drupes; but, in *P. microdontus* both the syncarp and the drupes are larger. The leaves also are much longer and broader.

Pandanus Kivi Martelli, Jour. Arnold Arb. **10**: 140. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5655, ridge rain-forests, 100 m. alt. (very slender; top branched into an open crown of very narrow leaves; trunk raised on a few prop-roots, both armed with scattered upturned prickles; syncarps pendent, solitary at the tips of branches, about 20 cm. long; drupes pale yellow).

Owing to our scanty representation of this species, for the present we are maintaining both *P. Kivi* Martelli and *P. Krauelianus* K. Schum. Both are characterized by pendent solitary syncarps 20–25 cm. long, with yellow drupes, and leaves similar in size and in contour. In *P. Kivi*, however, the leaf-margins are dentate at the base, becoming remotely appressed-serrate upward and closely serrate towards the apex; the free apex of the drupe is only slightly convex and the areola subdepressed. In *P. Krauelianus*, on the other hand, the leaf-serrations are not particularly appressed and perhaps a little more evenly distributed up the margin; the free apex of the drupe is distinctly convex and the upper surface of the slightly elevated areola is usually depressed.

Pandanus Krauelianus K. Schum. in K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 17. 1889; Warburg, Pflanzenr. **3(IV.9)**: 72. 1900; Martelli, Bot. Jahrb. **49**: 67. 1912, Webbia **4(1)**: 19. 1913, **4(2)**: t. 28, f. 4–6. 1914.

P. Beccarii sensu K. Schum. Bot. Jahrb. **9**: 192. 1888, non Solms-Laub.

P. flabellistigma Martelli, Webbia **1**: 366 (excl. descr. fol.). 1905, **4(1)**: 14. 1913, **4(2)**: t. 28, f. 7–10. 1914 (ide Martelli).

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3851, rain-forests, at 500 m. alt. (tree 8–10 m. high, supported on very thick, fluted, prickly prop-roots, and branched at the top; leaves numerous, spreading and drooping, on an average 1.5 m. long, 5 cm. broad; fruit-heads at length lateral amongst the leaves, closely invested, all but the tip, by numerous stiff dry bracts; when ripe, the pale yellow drupes fall from within the bracts leaving the latter and the receptacle persistent for several seasons; fruit-heads obscurely 3-angled, tapering slightly to a broad base and obtuse apex, \pm 30 cm. long, 7.5 cm. diameter; drupes sweet and fleshy); Fly River, 528 Mile Camp, *Brass*

6764, occasional in forest substage on ridges, at 80 m. alt.; Lake Daviumbu, Middle Fly River, *Brass* 7518, common in rain-forest substage on ridges.

It is to be noted that the syncarps at hand show considerable variation in the degree of convexity and flatness characteristic of the apical part of individual drupes. This species (as we interpret it) and *P. Kivi* Martelli are questionably distinct.

Pandanus xanthocarpus sp. nov. § *Lophostigma*. Pl. I, f. 17.

Planta 5–7 m. alta; trunco ramoso. Foliis 1.5–1.7 m. longis, 7.5–8 cm. latis, flexilibus, sensim acuminatis, basi dilatatis, subtus in parte superiore longitudinaliter venulosis, deorsum venis evanescentibus, glaucis; plicis lateralibus nudis vel apicem versus disperse dentatis; costa media supra canaliculata, subtus acuta, in parte superiore remotiuscule serrata, margine versus basin crebre laxiuscule dentato-serratis, dentibus acutis, subulatis, superioribus ascendentibus erectis, inferioribus ascendentibus vel subpatulis. Syncarpio (immaturo) 22 cm. longo, 11 cm. diametro, solitario, pendulo, oblongo-ovoideo; spathis numerosis, confertis, syncarpio longioribus, imbricatis, in plurimis ordinibus dispositis; drupis 3 cm. longis, vix 3 mm. latis, ad basin paullo angustioribus, confertis, linearibus, prismaticis, penta-hexagonis, pileo apicali 3–3.5 mm. longo, obtuse anguloso, subfacile secedente, apice concavo in pyramidem centralem crassam 0.5–0.7 mm. longam abrupte elevato, vertice plano et in stylum brevissimum lateraliter producto; stigmatibus dentiformi vel bilobo; mesocarpio superiore medullosa-fibroso, endocarpio lignoso, infra medium drupae sito, 13 mm. longo.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tumbuke, *Brass* 8487 (TYPE), December, 1936, common in rain-forest on a fresh-water creek; Western Division, Oriomo River, Dagwa, *Brass* 5942, Feb. 16, 1934, not uncommon in low timber belts along creeks, at 40 m. alt.

The field-notes on the type-collection indicate a tree 6–7 m. high, the thin prop-roots crowded under the stem and less than 1 m. long; those of *Brass* 5942 describe a tree 5–6 m. high without prop-roots, the top composed of a few divaricate branches. The fruits of both are said to be immature and in the second collection the drupes are pale yellow.

The apex of the drupes is very similar to that found in the fruit of *P. cernuifolius* except that in *P. xanthocarpus* the apex is distinctly concave and the central part is not so prominent. Since *P. cernuifolius* is so very immature it is impossible to say how the size of the drupes would compare. In *P. xanthocarpus* the fibres appear to extend directly to the

apex of the drupe rather than inclining toward the central axis as in *P. cernuifolius*. The latter species also has narrower leaves.

***Pandanus cernuifolius* sp. nov.** § *Lophostigma*. Pl. I, f. 20.

Planta 4 m. alta, non ramosa; trunco radicibusque aereis aculeis validis instructis. Foliis patentibus cernuisque, 1.5–1.6 m. longis, 5–5.3 cm. latis, in dimidia parte inferiore plicatis, in parte reliqua planis; plicis lateralibus versus apicem irregulariter serratis; costa media subtus versus basin inerme, angusta, acuta, remotiuscule serrulata, margine serrato-dentata, dentibus versus basin validis patulisque, sursum brevioribus remotiusculisque. Syncarpio (immaturo) 8 cm. longo, 4 cm. diametro, solitario, pendulo; spathis \pm 30 cm. longis; drupis (immaturis) 16 mm. longis, versus apicem 3 mm. latis, connatis, prismaticis, \pm hexagonis, pileatis; pileo sublibero, ex vix convexo subimpresso, parte centrali 1 mm. elevata, horizontaliter brevissimeque producta; vertice plano; stigmatibus parvo dentiformique vel paullo lobato, horizontali; mesocarpio supero fibroso.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3916 (TYPE), May 1, 1933, common in rain-forests (but only one tree seen in fruit), at 500 m. alt. (unbranched tree 4 m. tall, supported on a few short prop-roots; diameter of the stem below the leaves 4 cm.; stem and prop-roots armed with scattered stout prickles; leaves spreading and drooping, 1.5–1.6 m. long, 5–5.3 cm. wide; a solitary pseudo-terminal drooping syncarp completely inclosed in leafy dark green bracts; drupes orange-brown with glaucous bloom).

The leaves of this species are very much like those of *P. Kraucianus* K. Schum. and *P. Kivi* Martelli; but, the prominent areola of the apex of the drupes is more like that found in *P. Beccarii* Solms-Laub. than in the other species.

***Pandanus Beccarii* Solms-Laub.** Ann. Jard. Bot. Buitenz. 3: 97, t. 16, f. 7–11. 1883; F. Mueller, Descr. Notes Papuan Pl. 2: 68. 1890; Warburg, Pflanzenr. 3(IV.9): 71. 1900; Martelli, Webbia 4(1): 7. 1913, 4(2): t. 28, f. 20–25. 1914.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5283, 1500 m. alt., common in upper forests.

In 1888 K. Schumann reported *P. Beccarii* Solms-Laub. from New Guinea on the basis of *Hollrung* 164. Later he decided that Hollrung's collection represented a distinct species (*P. Kraucianus* K. Schum.).

Our specimens differ from the original description and Martelli's figures in that the leaves are up to 4 m. long, 6–8 cm. wide, not abruptly

acuminate, and the drupes are a little larger (2.6 cm. long, 4–6 cm. broad).

Pandanus floribundus sp. nov. § *Lophostigma*. Pl. I, f. 19.

Plantae gregariae 12–14 m. altae; trunco in parte superiore ramoso. Foliis \pm 3 m. longis, 7–8 cm. latis, subtus glaucis, basi dilatatis, apice sensim acuminatis; margine serrato-dentato, dentibus acutis, subulatis, apice rufescentibus, versus basin confertis, sursum laxiusculis; plicis lateralibus inermibus; costa media subtus prominula, in parte superiore serrulata. Syncarpio \pm 45 cm. longo, 14 cm. diametro; spathis persistentibus, imbricatis; drupis numerosissimis, dense adpressis, prismaticis, linearibus, 2 cm. longis, 3–5 mm. latis, rubris, apice brevissime pileatis; pileo purpureo-nigro, 1–2.5 mm. longo, obtuse anguloso, areola centrali \pm 0.5 mm. elevata; stylo subexcentrico, depresso, \pm bilobo; stigmatе parvo; endocarpio \pm 9 mm. longo, osseo; mesocarpio supero \pm 7 mm. longo, fibroso, infero 4–5 mm. longo, fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6975* (TYPE), June, 1936, common in substage of riverine forest, at 100 m. alt. (usually 2 or 3 individuals together in clumps 12–14 m. tall, with a few thick fluted stilt-roots 2–3 m. long, erect beneath them; stilt-roots and stem armed with scattered sharp prickles 1.5 cm. in length; stem branched to form a small crown; leaves \pm 3 m. long, glaucous underneath; fruit-heads cylindric, \pm 45 cm. long, 14 cm. in diameter, inclosed in persistent bracts and pendent amongst the leaves; drupes red, with purple-black apex).

This species strongly suggests *P. Beccarii* Solms-Laub., but the apex of the drupe is much shorter than in the latter species.

Pandanus lamprocephalus sp. nov. § *Lophostigma*. Pl. II, f. 4.

Arbor 5 m. alta, 7 cm. diametro; trunco non ramoso, aculeato, aculeis sparsis, sine ordine. Foliis 2.4 m. longis, 7–8 cm. latis, basi vix dilatatis, aurantiacis; apice contractis concavisque, acutis; margine serrato-dentato, dentibus brevibus, in parte basilari crebris; plicis lateralibus inconspicuis; costa media subtus in parte basilari obtuse et sursum acute carinata, versus apicem adpresse serrato-denticulata. Spadicibus axillaribus; spathis inferioribus aurantiacis, superioribus purpurascensibus; syncarpio late elliptico, 9 cm. longo, 7.5 cm. lato; drupis numerosis, confertis, 2.8–3.2 cm. longis, 1.5 cm. crassis, pyriformibus, obscure pentagonis, sensim deorsum attenuatis, basi 3 mm. crassis; pileo 7–8 mm. longo, tetra-pentagono, margine rotundato, supra abrupte in pyramidem centalem crassam 3 mm. longam elevato; apice \pm plano et in stylum nitidum brunneum undulatum oblique producto; stigmatе bilobo

vel subdigitato, verticali in latere pyramidali sito; endocarpio osseo, cuneato-oblongo, in parte superiore drupae sito, mesocarpio superiore 3 mm. longo, laxo fibroso, inferiore 15 mm. longo, compacte fibroso.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2878 (TYPE), Sept. 16, 1932, mountain rain-forests, at 900 m. alt. (unbranched tree 5 m. high, supported on a few thick stilt-roots. Stem 7 cm. diameter, faintly leaf-scarred and bearing scattered small prickles; leaves numerous, about 2.4 m. long, 7-8 cm. wide, orange-yellow on both sides at the base, under surface glaucous, midrib very pale, apex contracted and concave; fruit-heads in axils of lower leaves, lower bracts orange-yellow, upper purplish; cone 9 cm. \times 7.5 cm., very pale purple-gray, the raised processes brown).

In general outline the drupes somewhat suggest those of *P. ceratostigma* Martelli, but the stigma is unquestionably lateral allying this species with the section *Lophostigma*, rather than with the section *Ryckia* (to which *P. ceratostigma* belongs).

Section ACROSTIGMA

Pandanus Odoardi Martelli, Bull. Soc. Bot. Ital. 1904: 304. 1904, *Webbia* 4(1): 25, 1913, 4(2): t. 39, f. 6-11. 1914.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7190, at 100 m. alt. (scattered through sedge undergrowth in swampy parts of the forest. Plant stemless; leaves numerous, \pm 180 cm. long, 4.5 cm. broad, very dark above and very glaucous below; peduncle pseudo-terminal, erect, 50-60 cm. long; fruit-head ovoid, scarlet, soft and fleshy, 10.5 cm. long, 7 cm. diam.).

This species was described from the syncarp alone; the above field-note gives a brief word-picture of the habit of the plant.

The fruit-head somewhat suggests that of *P. ihuanus* Martelli, but the free apex of the drupes is much shorter and abruptly constricted at the base of the style in *P. Odoardi*.

Pandanus ihuanus Martelli, Jour. Arnold Arb. 10: 141. 1929, White, op. cit. 202.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3924, May 1, 1933, common in rain-forests, at 500 m. alt. (a trunkless species; two or three leaf-shoots forming a clump from a very short woody stock; roots produced from between the lower leaves; fruit-heads globose, 11 cm. long, 11.5 cm. diam.; drupes fleshy).

Pandanus rostellatus sp. nov. § *Acrostigma*. Pl. II, f. 1.

Humilis, caespitosus. Foliis 1.3 m. longis, 2-2.5 cm. latis, linearibus,

tessellatis, plicatis, apice acuminatis; margine serrato-denticulatis; costa media in parte basilari retrorse denticulata, in parte superiore remotiuscule serrata; plicis lateralibus obtusis, versus apicem remote serrulatis. Syncarpio \pm globoso, 6 cm. diametro, solitario, erecto; drupis numerosis, 2.8–3 cm. longis, 5 mm. latis, vulgo pentagonis, utrinque attenuatis; pileo 1.2 cm. longo, anguloso, laevi, libero, elongato-pyramidato, apice mucroniformi uncinatoque; stigmatibus anguste linearibus; endocarpio infra medium drupae sito, circiter 7–9 mm. longo, oblongo, supra plano-truncato; mesocarpio supero concavo.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5675 (TYPE in Herb. New York Bot. Gard.), December 15, 1933, common forest ground plant, at 100 m. alt. (several leaf-shoots in a clump; erect, solitary syncarp of orange-colored fruit, about 6 cm. in diameter).

The species suggests *P. caricosus* Kurz; but, the latter differs in having a pendulous syncarp and granular-scabrous drupes.

Pandanus Danckelmannianus K. Schum. Fl. Kaiser Wilhelms Land 18. 1889; Warburg, Pflanzenr. 3(IV.9): 80, f. 22, L-M. 1900; Martelli, Webbia 4(1): 11. 1913, 4(2): t. 32, f. 29. 1914.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7861, September, 1936, common on hillsides in rain-forest (stem 4–6 m. long, seldom branched, without prickles but with numerous upturned rootlets; prop-roots few, short and crowded; leaves to \pm 3 m. in length; inflorescence shortly pedunculate in axils of leaves, several to each plant; fruit-heads globose, apparently red when ripe). SOLOMON ISLANDS: Ysabel Island, Tiratona, *Brass* 3342, December 10, 1932, common in mountain rain-forests, at 600 m. alt. (tree up to 10 m. tall, no stilt roots; stem simple or branched near the summit, pale brown, with only very indistinct traces of leaf-scars, unarmed but bearing a few upturned dead-roots about 1 cm. long; fruit-heads several, lateral amongst the leaves, slightly reniform, 20 cm. diameter; drupes scarlet; leaves very numerous, averaging 3.5 cm. long, 12 cm. broad, underside glaucous, the tips bent and pendent).

Type from Northeastern New Guinea; reported also (by Martelli) from the Bismarck Archipelago.

These two collections illustrate both the mature and the immature stages of development of the fruit; in *Brass* 7861 the fruit-heads are about 7 cm. in diameter and are attached to a flattened peduncle \pm 16 cm. long covered with short obtuse spathes \pm 8 cm. long. The staminate spadix at hand is about 40 cm. long, covered with short blunt spathes \pm 8 cm. long and concave at the apices. Towards the apex, the

spadix branches into about 5 spikes covered with stamens; the filaments are very short, solitary or clustered in groups of two or three, the anthers are linear, \pm 7 cm. long, tipped with a cusp about 2 mm. long. In *Brass* 3342, the drupes are mature and the endocarp is about 1.5 cm. long.

Pandanus stenocarpus Solms-Laub. Ann. Jard. Bot. Buitenz. **3**: 91, *t.* 16, *f.* 1. 1883; Warburg in Engl. Pflanzenr. **3(IV.9)**: 83, *f.* 22D. 1900; Martelli, Webbia **4**(1): 32. 1913, **4**(2): *t.* 32, *f.* 30. 1914.

BRITISH NEW GUINEA: Mafalu, Central Division, *Brass* 5345, Oct. 22, 1933, lower primary forest, at 1250 m. alt. (about 6 m. high; trunk unbranched, supported on prickly stilt-roots; leaves usually about 4 m. long, glaucous beneath; syncarp red, solitary and lateral, irregularly spherical, 20 cm. \times 13 cm. \times 13 cm., on a short flat peduncle, much of the syncarp concealed amongst the leaves; drupes slender).

Type from Dutch New Guinea.

This species, described by Solms-Laubach in 1883, from a few empty drupes seems to be known in literature only from the original collection. Although our material is somewhat fragmentary, in addition to the information contributed by the field-label, we find that the leaves are 14 cm. broad near the base, about 11 cm. broad near the middle (?), tapering gradually to a long acuminate apex. The dentate margin with teeth 4-5 mm. long towards the base gradually becomes finely and closely serrate towards the apex, but the lateral folds are finely aculeate only towards the apex. Unfortunately the syncarp is not entire, so that we have only \pm isolated drupes for study. In these most of the spiny tips are broken off; the endocarp is 1-1.5 cm. long and practically basal. A young inflorescence about 20 cm. long in the axil of an upper leaf consists of imbricate, bluntly acuminate spathes.

Pandanus Lauterbachii K. Schum. & Warburg, Pflanzenr. **3(IV.9)**: 81. 1900; Martelli, Webbia **4**: 21. 1913, Jour. Arnold Arb. **10**: 141. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5791 (♀), 5892 (♂); Fly River, 528 Mile Camp, *Brass* 6829 (♀); Sturt Island, Lower Fly River, *Brass* 8138 (♂).

Type from Northeastern New Guinea.

The above cited collections compare favorably with *Brass* 986 (Lepokera, Vailala River) determined by Martelli. The branching staminate spadix of *P. Lauterbachii* K. Schum. & Warb. as illustrated by *Brass* 8138 is about 1 m. long. The broadly lanceolate to narrowly ovate spathes are white and vary from 30 to 15 cm. in length, the smaller being towards the

apex of the spadix. The anthers are 1.5–2 cm. long, linear and abruptly acuminate or cuspidate.

Pandanus setistylus Warburg, Pflanzenr. 3(IV.9): 81, f. 22A–C. 1900; Martelli, Webbia 4: 30. 1913.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 355, edge of jungle, at \pm 900 m. alt.

EXPLANATION OF THE PLATES

PLATE I

All figures natural size except as otherwise specified.

- FIG. 1. *Freycinctia lacta* Merr. & Perry: an immature syncarp (♀) in profile; *a*, a berry.
- FIG. 2. *Freycinctia dicaricata* Merr. & Perry: two adnate berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 3. *Freycinctia polyclada* Merr. & Perry: the tip of a branch with a syncarp; *a*, two berries in profile; *b*, a seed (natural size, and $\times 5$ linear).
- FIG. 4. *Freycinctia orcophila* Merr. & Perry: a berry; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 5. *Freycinctia membranacea* Merr. & Perry: two berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 6. *Freycinctia nesiotica* Merr. & Perry: a berry; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 7. *Freycinctia salamaucensis* Merr. & Perry: a cluster of berries in profile; *a*, the same from above; *b*, a seed (natural size, and $\times 5$ linear).
- FIG. 8. *Freycinctia anomala* Merr. & Perry: a berry (very immature); *a*, the same from above.
- FIG. 9. *Freycinctia nervosa* Merr. & Perry: a cluster of berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 10. *Freycinctia Archboldiana* Merr. & Perry: a cluster of berries (very immature); *a*, the same from above.
- FIG. 11. *Freycinctia undulata* Merr. & Perry: a part of a longitudinal section of a syncarp; *a*, a berry (immature).
- FIG. 12. *Freycinctia percostata* Merr. & Perry: a cluster of berries; the apex of a berry and a seed (both: natural size, and $\times 5$ linear).
- FIG. 13. *Pandanus aggregatus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 14. *Pandanus exiguus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 15. *Pandanus nemoralis* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above; *b*, a drupe in longitudinal section.

- FIG. 16. *Pandanus paludosus* Merr. & Perry: a cluster of drupes; *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 17. *Pandanus xanthocarpus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 18. *Pandanus microdontus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 19. *Pandanus floribundus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 20. *Pandanus cernuifolius* Merr. & Perry: the apex of a single drupe in profile; *a*, a cluster of drupes from above (immature).
- FIG. 21. *Pandanus Archboldianus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.

PLATE II

- FIG. 1. *Pandanus rostellatus* Merr. & Perry: a cluster of drupes in profile; *a*, the apex of a single drupe; *b*, a drupe in longitudinal section.
- FIG. 2. *Pandanus meniscostigma* Merr. & Perry: some drupes in profile; *a*, the same from above.
- FIG. 3. *Pandanus Kajeveskii* Merr. & Perry: a phalange; *a*, the same in longitudinal section.
- FIG. 4. *Pandanus lamprocephalus* Merr. & Perry: a drupe in profile (from two different angles); *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 5. *Pandanus limbatus* Merr. & Perry: a phalange in profile.
- FIG. 6. *Pandanus buinensis* Merr. & Perry: a cluster of drupes in profile.
- FIG. 7. *Pandanus capitellatus* Merr. & Perry: a phalange; *a*, the same from above; *b*, the same in longitudinal section.
- FIG. 8. *Pandanus Julianettii* Martelli: a drupe in profile; *a*, the same from above.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.